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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 11, NUMBER 12
JUNE 15, 1978

W78-05201 -- W78-05700

The Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the Bio-Science Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Nonwater Activities; Watershed Protection.

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08 ENGINEERING WORKS
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09 MANPOWER, GRANTS, AND FACILITIES
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10 SCIENTIFIC AND TECHNICAL INFORMATION
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

UNITED STATES GEOLOGICAL SURVEY YEARBOOK, FISCAL YEAR 1977.
Geological Survey, Reston, VA.
For primary bibliographic entry see Field 9D.
W78-05419

2A. General

WATER AVAILABLE FOR RUNOFF FOR 4 TO 15 DAYS DURATION IN THE SNAKE RIVER BASIN IN IDAHO,
National Oceanic and Atmospheric Administration, Silver Spring, MD. Office of Hydrology.
For primary bibliographic entry see Field 4A.
W78-05365

TEHM: A TERRESTRIAL ECOSYSTEM HYDROLOGY MODEL,
Oak Ridge National Lab., TN. Environmental Sciences Div.
For primary bibliographic entry see Field 2G.
W78-05565

A BAYESIAN APPROACH TO MULTIVARIATE HYDROLOGIC SYNTHESIS,
Massachusetts Inst. of Tech., Cambridge Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 8B.
W78-05586

EXPERIMENTAL INVESTIGATION OF WATERSHED SURFACE RUNOFF A CONTRIBUTION TO THE INTERNATIONAL HYDROLOGICAL DECADE,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W78-05587

CATALOG OF UNITED STATES CONTRIBUTIONS TO THE INTERNATIONAL HYDROLOGICAL DECADE 1965-1974.
National Committee for the International Hydrological Decade, Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 155, Price codes: A12 in paper copy, A01 in microfiche. National Academy of Sciences, Washington, D.C., 1975. 271 p. NSFC-310, TO 153.

Descriptors: *International Hydrological Decade, *United States, *Publications, Mathematical models, Evaporation, Bibliographies, Stations, Sediment transport, Lakes, Reservoirs, Snow, Projects, Data collections, Rainfall, Streamflow, Glaciers, Hydrologic cycle, Hydrology, Reviews, Water balance, Groundwater, Demonstration watersheds, Education, Training, Information exchange, *Catalogs, Decade stations, Benchmark stations.

The International Hydrological Decade (1965-1974) was a cooperative international program coordinated by UNESCO and involving the efforts of more than 100 nations. Its purpose were to strengthen the scientific basis for water use and conservation, to stimulate education and training in hydrology, and to improve the ability of developing and developed countries alike to cope with their water problems. Each country participating in the Decade was responsible for its own program. The U.S. program included some new, distinctively IHD activities, and many projects selected from the ongoing activities of federal, state, and private agencies. Those projects selected from ongoing activities, together with the distinctly IHD activities, are called the U.S. contributions to the International Hydrological Decade, and their results were presented here in summary form. The information on each listed activity includes project title, agency principal investigator, objectives, significant results, and reports available publicly. This information was supplied by the individual agency conducting the activity. (Froehlich-ISWS)
W78-05590

2B. Precipitation

WATER AVAILABLE FOR RUNOFF FOR 4 TO 15 DAYS DURATION IN THE SNAKE RIVER BASIN IN IDAHO,
National Oceanic and Atmospheric Administration, Silver Spring, MD. Office of Hydrology.
For primary bibliographic entry see Field 4A.
W78-05365

OPTIMAL SAMPLING AND ANALYSIS USING TWO VARIABLES AND MODELED CROSS-COVARIANCE FUNCTIONS,
North Dakota Univ., Grand Forks, Dept. of Aviation.
P. J. Brady.
Journal of Applied Meteorology, Vol. 17, No. 1, p 12-21, January 1978. 10 fig, 3 tab, 7 ref. NSF GA-16034.

Descriptors: *Radar, *Precipitation(Atmospheric), *Rainfall, *Analytical techniques, Data processing, Mathematical models, Statistics, Correlation analysis, Aircraft, Rain gages, Measurement, Meteorology, *Radar-rainfall relationships.

An objective analysis technique of the Eddy-Gandin type was discussed. The technique permits the analysis and investigation of multivariate as well as univariate data sets. A multivariate data configuration consisting of raingage/radar precipitation measurements was analyzed. Analysis included determination of spatial-temporal correlation and cross-correlation structure functions from the observations, univariate and multivariate analysis of the surface precipitation field, and an exploration of the relative worth of different Z-R relationships in a multivariate environment. Investigative results indicated that the structure functions were quite dependent on the spatial-temporal form of the precipitation system, that the multivariate analyses were consistently better than the univariate analyses, and that the Z-R relationship normally did not produce noticeable differences when used in a multivariate environment. The incorporation of this analysis technique with a nonlinear programming algorithm for use as an experimental design tool also was discussed. The potential of this design methodology was presented using raingage/radar structure functions. Optimal spatial sensor configurations were determined for one sensor type, and trade-offs between different instrument types using that configuration were explored. (Sims-ISWS)
W78-05378

RAINFALL FIELDS IN ISRAEL AND JORDAN AND THE EFFECT OF CLOUDING SEEDING ON THEM,
Hebrew Univ., Jerusalem (Israel). Inst. of Earth Sciences.
For primary bibliographic entry see Field 3B.
W78-05379

THE PRACTICABILITY OF DRY ICE FOR ON-TOP SEEDING OF CONVECTIVE CLOUDS,
Bureau of Reclamation, Miles City, MT.
For primary bibliographic entry see Field 3B.
W78-05380

MICROPROBE ANALYSIS OF PROJECT DUSTORM HAILSTONE SAMPLES,
National Center for Atmospheric Research, Boulder, CO.
For primary bibliographic entry see Field 2K.
W78-05381

AIR-TRUTH LIDAR POLARIZATION STUDIES OF OROGRAPHIC CLOUDS,
Wyoming Univ., Laramie. Dept. of Atmospheric Science.
K. Sassen.
Journal of Applied, Meteorology, Vol 17, No 1, p 73-91, January 1978. 22 fig, 5 tab, 6 ref. NSF ATM 75-02515, ATM76-17352.

Descriptors: *Remote sensing, *Cloud physics, *Instrumentation, Equipment, Measurement, Clouds, Snow, Ice, Rime, Crystals, Precipitation(Atmospheric), Aircraft, Meteorology, *Lidar, Hydrometeor, Orographic clouds.

The results of a field program of coordinated lidar and aircraft observations of orographically induced clouds were reported. An evaluation of polarization diversity lidar for cloud physics research applications on the basis of the air-truth measurements and earlier findings indicated that the remote sensing technique can monitor some kinds of cloud microphysical information currently measured only through in situ sampling methods. In particular, lidar polarization measurements were indicated from the observations to be sensitive to the composition of mixed phase clouds, including a measure of cloud ice balance, and to permit observations of the ice particle riming process in precipitation formation. Detailed vertical cross sections of hydrometeor content were derived from height versus time displays of lidar returns in combination with the polarization analysis, revealing some interesting features of the structure of complex orographic cloud systems. As a further aid in the evaluation of lidar, the operational restrictions of typical lidars during field operations also were discussed. It was concluded that polarization diversity lidar displays the potential for important applications in cloud physics and modification research programs involving the study of particles in the ice phase. (Sims-ISWS)
W78-05382

A COMMENT ON THE SIZE DISTRIBUTION OF THE DROPLETS FOUND IN CLOUD BASES,
Maine Univ. at Orono. Dept. of Physics.
J. Fastook, and M. A. Vietti.
Journal of Applied Meteorology, Vol 17, No 1, p 115-117, January 1978. 1 fig, 9 ref.

Descriptors: *Cloud physics, *Drops(Fluids), *Model studies, Mathematical models, Laboratory tests, Nucleation, Salts, Temperature, Humidity, Growth rates, Clouds, Precipitation(Atmospheric), Meteorology, *Cloud droplets, Size distributions.

Growth histories of droplets were compared, and a qualitative argument was given for the generation of the droplet size distribution in the base of a cloud. The distribution was generated by considering only the effects of vapor depletion and environmental heating and by assuming that the condensation nuclei was organized into families of the same critical supersaturation, which begin to mix after moving up through the lower levels of the cloud. (Sims-ISWS)
W78-05383

THE INFLUENCE OF CLIMATE ON FLOODS IN SMALL BASINS, AS DEFINED BY RAINFALL-RUNOFF MODELING,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2E.

W78-05423

A STUDY OF HAWAIIAN WARM RAIN SHOWERS BASED ON AIRCRAFT OBSERVATION,
Hawaii Univ., Hilo. Cloud Physics Observatory.
T. Takahashi.
Journal of the Atmospheric Sciences, Vol. 34, No. 11, p 1773-1790, November 1977. 16 fig, 1 tab, 21 ref. NSF ATM76-18553, ONR N00014-77-C-0031.

Descriptors: *Rainfall, *Cloud physics, *Aircraft, *Hawaii, On-site investigations, On-site data collections, Model studies, Instrumentation, Sampling, Raindrops, Particle size, Temporal distribution, Electrical conductance, Meteorology, *Cloud models, Raindrop size distribution, Warm showers.

Warm rain off the island of Hawaii was followed by aircraft beneath the cloud base from the beginning of the shower to the end, and newly designed instruments were used to observe time and spatial distributions of rainwater content and raindrop size distribution as a function of cloud-top height. Based on 110 h of observation, rain showers were classified into two main groups: isolated showers and line showers. Isolated showers were subdivided into base showers (showers developing under the cloud base) and side showers (showers developing outside of the cloud area). Line showers were subdivided into showers moving at right angles to the cloud line, showers moving parallel to the cloud line, standing showers, and showers which formed successively upwind of the present shower line. These cloud classes are intimately related to the profile of upper wind. The following observations were reported: Two shower peaks, with weak showers at the cloud center are observed along the flight line when the upper wind is weak, irrespective of cloud type, while only a single shower peak is seen when a strong wind shear exists near the cloud top. Initial weak rainfall with small raindrops is followed by heavy rainfall with large raindrops (1.5-2.5 mm in diameter). Then the rain gradually weakens with small raindrops. On the other hand, in many cases raindrops from side rain are small and there are no peak raindrops. Differences were observed in different cloud types with respect to shower lifetime and magnitude of rainwater content. For isolated side showers, lifetime is about 10 min, while for isolated base showers it is 20 min; for line showers, it is 30 min. In isolated clouds, rain starts when the cloud top height reaches 2 km (cloud base is around 600 m); in line clouds, rain starts when the cloud top reaches 1.5 km. Higher clouds produce heavier rain. An isolated cloud with cloud-top height of 2.5 km produces maximum rainwater of lg/cu m, while a line shower from clouds of similar height produces rain two to three times heavier. Line showers also have higher mean time and space rainwater content than isolated showers. Observational results from base showers were compared with an aximmetric cloud model. The reason for longer shower life and heavier rainfall from line clouds may be the existence of strong inflow near the surface and updraft over a broad area which maintains the line cloud. (Sims-ISWS)
W78-05582

EXPERIMENTAL INVESTIGATION OF WATERSHED SURFACE RUNOFF A CONTRIBUTION TO THE INTERNATIONAL HYDROLOGICAL DECADE,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
Y. Y. Shen, B. C. Yen, and V. T. Chow.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 582, Price codes: A10 in paper copy, A01 in microfiche. Hydraulic Engineering Series No. 29, 1974. 215 p, 52 fig, 4 tab, 69 ref, 2 append. NSF GK-11292, NSF GK 40867.

Descriptors: *Demonstration watersheds, *Storm structure, *Rainfall intensity, *Dimensional analysis, Time lag, Peak discharge, Hydrology, Recession curves, Rainfall-runoff relationships, Methodology, *Rainstorm characteristics, Basin characteristics, Storm movement.

An extensive systematic experimental program was conducted to test the effects of rainstorm characteristics including: (1) rainfall intensity, (2) rainfall duration, (3) velocity of rainstorm movement, and (4) non-uniform areal distribution of rainfall. Also tested were the watershed characteristics including size, shape, and slope of the watershed on producing surface run-off from an inpervious basin. The peak discharge and characteristic times of surface run-off hydrographs included were: (1) the time of occurrence of peak discharge, (2) the time from rainfall commencement to the first occurrence of runoff at the watershed outlet, (3) the time lag between the centroid of the hydrograph and the time of peak discharge, and (4) the recession time required for the runoff to reduce from peak to half peak value. Through a dimensional analysis, the experimental results were presented in a non-dimensional form for general use, interpretation, and discussion. (Singh-ISWS)
W78-05587

BIBLIOGRAPHY OF STATISTICAL AND METEOROLOGICAL METHODOLOGY IN WEATHER MODIFICATION,
Florida State Univ., Tallahassee. Dept. of Statistics.
For primary bibliographic entry see Field 3B.
W78-05591

PROJECT SKYWATER 1973-74 BIENNIAL REPORT.
Bureau of Reclamation, Denver, CO. Engineering and Research Center.
For primary bibliographic entry see Field 3B.
W78-05594

RAINFALL NETWORK SYSTEMS ANALYSIS: THE OPTIMAL ESTIMATION OF TOTAL AREAL STORM DEPTH,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
R. L. Lenton, and I. Rodriguez-Iturbe.
Water Resources Research, Vol. 13, No. 5, p 825-836, October 1977. 8 fig, 2 tab, 23 ref, 1 append. C-4118(No 9021)(15), OWRT 14-31-0001-9021, NOAA 4-3673.

Descriptors: *Network design, *Rain gages, *Model studies, Numerical analysis, Rainfall, Precipitation(Atmospheric), Storms, Runoff, Networks, Variability, Costs, Systems analysis, Measurement, Meteorology, Mathematical models.

The design of rainfall networks for the purpose of estimating areal averages of rainfall was formulated as a mathematical programming problem whose objective function is the minimization of the cost and mean square error of the network and whose decision variables are the total number of rain gages, the corrdinates of each, and the estimator weights. A two-stage methodology was proposed, wherein the optimal configuration of the network is determined first, followed by the optimal estimator weights. A case study was presented in order to illustrate the various concepts developed. (Sims-ISWS)
W78-05669

2C. Snow, Ice, and Frost

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XV. TRANSPORT.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05220

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XVI. HAZARDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05221

BIOGEOCHEMISTRY OF DEEP LAKES IN THE CENTRAL ALASKAN RANGE,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 5A.
W78-05358

SUPPRESSION OF ICE FOG FROM COOLING PONDS,
Cold Regions Research and Engineering Lab., Hanover, NH.
For primary bibliographic entry see Field 2D.
W78-05359

WATER AVAILABLE FOR RUNOFF FOR 4 TO 15 DAYS DURATION IN THE SNAKE RIVER BASIN IN IDAHO,
National Oceanic and Atmospheric Administration, Silver Spring, MD. Office of Hydrology.
For primary bibliographic entry see Field 4A.
W78-05365

A STUDY OF MICROWAVE EMISSION PROPERTIES OF SEA ICE - AIDJEX 1972,
Aerojet ElectroSystems Co., Azusa, CA.; and Department of the Environment, Ottawa (Ontario); and Geological Survey, Tacoma, WA. Water Resources Div.
D. C. Meeks, R. O. Ramseier, and W. J. Campbell.
In: Proceedings of the IXth International Symposium on Remote Sensing of the Environment, Vol 1, held in Ann Arbor, Michigan, April 15-19, 1974, p 1-14, 1974. 17 fig, 8 ref.

Descriptors: *Remote sensing, *Microwaves, *Instrumentation, *Sea ice, *Arctic Ocean, Analytical techniques, Mapping, Salinity, Contours, *Microwave emissivities, Surface-truth measurements, Pack ice age.

Results derived from a comparative study of surface-based 13.4 GHz passive microwave measurements with detailed surface-truth measurements concerning the physical, chemical, and structural properties of Arctic sea ice illustrate distinct decreasing microwave emissions for first-year, transitional and multiyear sea ice types. For transitional and multiyear ice, a structural relationship for microwave emissions by sea ice exists. Both vertically and horizontally polarized measured brightness temperatures decrease linearly with increasing average ice porosity. In the case of first-year ice, however, measured brightness temperatures are comparatively uniform and microwave emission appears to be more strongly influenced by high near-surface salinity concentrations combined with the occurrence of uniform porosity. (Woodard-USGS)
W78-05425

DAM IN THE VILYUY HYDRAULIC POWER SYSTEM,
For primary bibliographic entry see Field 8D.

W78-05589

HYDROLOGICAL FIELD INVESTIGATIONS FOR DESIGNING HYDROELECTRIC POWER-PLANTS,
For primary bibliographic entry see Field 8C.
W78-05593

OBSERVATIONS ON ICE DEPOSITED BY WAVES ON ALASKAN ARCTIC BEACHES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
A. D. Short.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 818, Price codes: A02 in paper copy, A01 in microfiche. Technical Report No. 211, June 1976. Reprint from LaRevue de Geographie de Montreal, Vol 30, No 1-2, p 115-122, 1976. 11 fig, 14 ref. ONR N00014-69-A-0211-0005.

Descriptors: *Ice, *Beaches, *Alaska, *Arctic, Cold regions, Waves(Water), Ocean waves, Coasts, Lagoons, Sea ice, Sediments, Deposition(Sediments), Melting, Geomorphology, Onsite investigations, Deposition(Ice).

Ice deposited by waves on Alaskan arctic beaches is derived from either pack ice or newly formed sludge ice of frazil and is dependent upon wind- and tide-generated currents to move it into the nearshore zone and on wave action to carry it onto the beach. Three basic types of ice are involved: (1) drift ice, consisting of pieces of multi-year or pack ice, may be deposited at any time during the summer season; (2) sludge ice, first forms on brackish lagoonal and estuarine water bodies from which currents regulary flush it into the nearshore zone where waves may wash it onto the shore; (3) swash mass, foam, and spray begin to freeze on the beach face as both air and water temperatures drop below 0C. The above processes result in formation of beach structures composed of embedded pieces of ice, sludge ice beams, layers of sediment. The winter beach also may contain ice ridges commonly 2-3 m high resulting from icefoot development and pack ice buckling over shorefast ice. Melting of the ice and snow generates beach subsidence and collapse features such as dettle holes, elongate depressions, sand-gravel piles and ridges, and distorted bedding. (Sims-ISWS)
W78-05595

APPARATUS AND METHOD FOR RECOVERING OIL FROM ICY WATERS,
Artec, Inc., Columbia, MD. (Assignee).
For primary bibliographic entry see Field 5G.
W78-05609

THE INTERACTION OF OIL WITH SEA ICE IN THE ARCTIC OCEAN,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-05629

DYNAMICS OF NEAR-SHORE ICE,
Cold Regions Research and Engineering Lab., Hanover, NH.
A. Kovacs, and W. F. Weeks.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 16. Hazards, p 151-163, March 1977. 01-5-022-1651.

Descriptors: *Sea ice, *Remote sensing, *Hazards, Baseline studies, Resources development, Engineering structures, *Outer Continental Shelf, Beaufort Sea, Bering Strait, Prudhoe Bay, Petroleum development, Offshore operations.

A knowledge of motion, deformation and physical characteristics of both the near-shore pack ice and the fast ice is essential to adequately design and estimate the hazards associated with a variety of engineering options that may be considered for offshore operations in the near coastal areas of the Beaufort and Chukchi Seas (e.g. construction of gravel islands, structural platforms, causeways, buried pipelines, or the utilization of the ice sheet itself to carry large, long-term loads). Laser observations of fast ice motion at sites close to Narwhal Island show long term changes in the distance to targets located on the ice that are believed to be primarily the result of the thermal expansion of the sea ice. The main ice motion was outward normal to the coast (in the least-constrained direction). Observations coupled with published U.S. and Russian results suggest that very large areas of sea ice have sufficiently similar c-axes orientations to act as a large single crystal. If this proves to be the case off-shore structures may have to be designed for 'hard-fail' ice strengths which are 2 to 6 times the strength values normally used. The Russian theory that such orientations are aligned parallel to the magnetic field is shown to be doubtful. (See also W78-05221) (Sinha-OEIS)
W78-05630

DYNAMICS OF NEAR SHORE ICE,
Washington Univ., Seattle. Div. of Marine Resources.
For primary bibliographic entry see Field 5B.
W78-05631

THE ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY OF THE GULF OF ALASKA COASTAL PLAIN AND THE COASTAL ZONE OF KOTZEBUE SOUND,
Alaska Univ., College. Dept. of Solid Earth Science.
For primary bibliographic entry see Field 2L.
W78-05632

THE ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY OF THE GULF OF ALASKA COASTAL PLAIN,
Alaska Univ., College. Div. of Geoscience.
For primary bibliographic entry see Field 2L.
W78-05633

DELINEATION AND ENGINEERING CHARACTERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA,
Cold Regions Research and Engineering Lab., Hanover, NH.
P. F. Sellmann, S. Blouin, J. Brown, and E. Chamberlain.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 16. Hazards, p 385-395, March 1977. 1 fig, 1 tab. 01-50-22-2313.

Descriptors: *Permafrost, *Cold regions, *Hazards, Baseline studies, Resources development, Drilling, Alaska, *Outer Continental Shelf, *Subsea permafrost, Siting, Beaufort Sea, Prudhoe Bay, Petroleum development, Offshore operations, Natural hazards.

The Cold Regions Research and Engineering Laboratory (CRREL) spring 1976 drilling and in situ probing investigations provided numerous samples, data, and subsequent interpretations and have furthered understanding of subsea permafrost. Permafrost was present in the four holes drilled at Prudhoe Bay. Ice-bonded permafrost was absent in the upper 30 meters of sediment up to 17 kilometers from shore. Based on negative temperature gradients and pre water chemistry, ice-bonded permafrost should be encountered at 30- and 43-meter depths at sites PB-2 and PB-3, respectively. It appears that the depth to the ice-bonded permafrost decreases with increasing distance from shore and depth of water. Highly overconsolidated marine clays were encountered seaward of Reindeer Island. The overconsolidation probably resulted from the freeze-thaw history. The presence of these stiff, marine clay deposits is an important consideration for siting structures associated with offshore developments. Adequate delineation of the engineering properties of subsea permafrost is necessary in order to evaluate the hazards in and constraints of oil and gas developments in the Beaufort Sea. (See also W78-05221) (Sinha-OEIS)
W78-05634

OFFSHORE PERMAFROST STUDIES, BEAUFORT SEA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05635

MARINE ENVIRONMENTAL PROBLEMS IN THE ICE COVERED BEAUFORT SEA SHELF AND COASTAL REGIONS,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05636

OFFSHORE PERMAFROST - DRILLING, BOUNDARY CONDITIONS, PROPERTIES, PROCESSES AND MODELS. DELINEATION OF MOST PROBABLE AREAS FOR SUBSEA PERMAFROST IN THE CHUKCHI SEA FROM EXISTING DATA. SUBSEA PERMAFROST: PROBING, THERMAL REGIME AND DATA ANALYSIS,
Alaska Univ., College. Geophysical Inst.
W. D. Harrison, and T. E. Osterkamp.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 17. Hazards, p 424-466, March 1977. 8 fig, 2 tab, 12 ref, append. 03-5-022-55.

Descriptors: *Permafrost, *Ice, Baseline studies, Seasonal, Hazards, Alaska, Resources development, *Outer Continental Shelf, Chukchi Sea, *Beaufort Sea, Petroleum development, Environmental conditions.

Based on results to date the following conclusions were reached. Existing data suggest that permafrost may be largely absent in the southern Chukchi Sea except in near-shore areas. Ice-bearing subsea permafrost soil is mechanically bonded by the ice in some situations but not in others. Permafrost temperatures on land at Prudhoe Bay suggest a lower mean temperature over the past year or so than the recent average. Seasonal variations and mean annual sea bed temperature at Prudhoe Bay were studied. Probing measurements have identified a seasonally active permafrost layer under the sea bed in near shore areas. Application of a crude thermal model suggests that ice bearing permafrost may be found well out on the Beaufort Sea shelf. Some tentative remarks about the possible general and distribution of subsea permafrost in the Beaufort Sea were made. (See also W78-05222) (Sinha-OEIS)
W78-05641

BEAUFORT SEACOAST PERMAFROST STUDIES,
Alaska Univ., College. Geophysical Inst.
J. C. Rogers, and J. L. Morack.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 17. Hazards, p 467-510, March 1977. 17 fig, 1 tab, 16 ref. 03-5-022-55.

Descriptors: *Permafrost, *Baseline studies, Hazards, Alaska, Resources development, Foundations, *Barrier Islands, *Outer Continental Shelf, *Beaufort Sea, Petroleum development, Environmental conditions.

The objective of this study was to develop an understanding of the nature and distribution of permafrost beneath the ocean and barrier islands along the Alaskan Beaufort Sea Coast. One major implication is that bottom founded structures and buried pipelines will probably not be affected by offshore permafrost if they are sufficiently far from shore. Perhaps near the shore, it will be necessary to design hot oil pipelines supported by artificial causeways to bridge the shallow permafrost zone, but at greater distances from shore it may be possible to bury them. In all cases, the irregular and thermally fragile upper surface of the bonded permafrost warrants care in determining operational methods offshore. Seismic reconnaissance on three barrier islands indicates that they are not completely underlain by bonded permafrost, but that some may be completely free of ice-bonded permafrost. From the standpoint of offshore petroleum development, the islands may be useful platforms for drilling purposes. The fact that all offshore islands are not underlain by bonded permafrost provides an important distinction from the standpoint of their history and formation. A complete understanding of island growth and movement must include an understanding of their different permafrost characteristics. (See also W78-05222) (Sinha-OEIS)
W78-05642

SEISMICITY STUDIES: (A) NORTHEAST ALASKA AND (B) NORTON AND KOTZEBUE SOUNDS,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W78-05650

2D. Evaporation and Transpiration

WATER REQUIREMENTS AND APPLICATION RATES FOR LAWNS,
Wyoming Univ., Laramie. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3D.
W78-05201

DIFFUSION RESISTANCE AND XYLEM POTENTIAL IN STRESSED AND UNSTRESSED NORTHERN HARDWOOD TREES,
Northeastern Forest Experiment Station, Durham, NH.
For primary bibliographic entry see Field 2I.
W78-05246

DIFFERING DIFFUSIVE RESISTANCE AND LEAF DEVELOPMENT MAY CAUSE DIFFERING TRANSPIRATION AMONG HARDWOODS IN SPRING,
Northeastern Forest Experiment Station, Durham, NH.
C. A. Federer.
Forest Science 22, p 359-364, September 1976. 2 fig, 1 tab, 15 ref.

Descriptors: *Transpiration, *Spring, *Stomata, Leaves, Phenology, Chlorophyll, Deciduous trees, Leaf conductance, Leaf resistance, Leaf development, New Hampshire.

Buds of several Betula and Prunus species and of Populus tremuloides broke before those of other species in spring, exposing green leaves having diffusive resistances as low as 5 s/cm. Leaves of Acer saccharum and Fagus grandifolia unfolded 10 days later and initially had resistances around 7 s/cm. Quercus rubra and Q. coccinea leaves developed still later, were initially chlorotic, and had resistances over 10 s/cm. This initially high resistance may help to reduce transpiration in these ring-porous species until the conducting system of the new annual ring is well developed. Resistance decreased during and after leaf expansion to final values of 3 to 5 s/cm in all species. Resistance of adaxial surfaces of all species were nearly always greater than 30 s/cm. Apparently in newly unfolded leaves, cuticular resistance is high, but in some species, stomata are open. Both leaf area and diffusive conductance and leaf length squared indicated that transpiration begins several weeks earlier in Betula and P. tremuloides than in Quercus; Prunus, A. saccharum, and F. grandifolia are intermediate. (Forest Service)
W78-05247

SUPPRESSION OF ICE FOG FROM COOLING PONDS,
Cold Regions Research and Engineering Lab., Hanover, NH.
T. McFadden.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A035 322, Price codes: A05 in paper copy, A01 in microfiche. CRREL Report 76-43, November 1976. 86 p, 50 fig, 8 tab, 81 ref, 1 append.

Descriptors: *Ice fog, *Cooling water, *Alaska, Monomolecular films, Cooling, Ice, Fog, Powerplants, Heat transfer, Microclimatology, Evaporation, Evaporation pans, *Eielson Air Force Base(Alaska), *Fairbanks(Alaska).

Ice fog generated at the Eielson AFB power plant cooling pond contributes heavily to the total ice fog problem on the base. Several methods for ice fog suppression were studied, and two techniques were tested experimentally. Experiments also were conducted to determine the magnitude of the various modes of heat transfer within the pond's microclimate. Values of evaporative and radiative heat loss during the fog were presented. Ice cover was shown to be an effective fog suppression technique. Monomolecular films were also shown to be effective and offered some unique advantages, such as the ease of application and low overall cost. The heat normally lost to evaporation has to be dissipated by other means during suppression. With the ice cover technique, this was accomplished by melting the ice cover. During suppression with monomolecular films, the heat has to be dissipated by increasing radiative and convective losses. The simplicity of application of monomolecular films and their lower cost combined to make this technique attractive; however, the lower pond temperatures and increased suppression effectiveness weighs heavily in favor of the ice-cover technique. (Roberts-ISWS)
W78-05359

THE STRATIGRAPHY AND GEOMORPHOLOGY OF THE HOFMANN FOREST POCOSIN,
Soil Conservation Service, Raleigh, NC. and North Carolina State Univ. at Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 2H.
W78-05577

2E. Streamflow and Runoff

ANALYSIS OF THE SEASONAL STREAMFLOW VARIATION FOR THE PRIMARY UNREGULATED WATER COURSES IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Civil Engineering.
J. N. Dornbush.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 035, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, December, 1975. 35 p, 2 fig, 7 tab, 8 ref. OWRT A-033-SDAK(1), 14-31-0001-3542.

Descriptors: *Flow measurement, *Flow rates, *Low-flow frequency, *Streamflow, *River flow, Flow profiles, Flow duration, Flow characteristics, Irrigation, Irrigation permits, Dissolved oxygen, Seasonal, Fluctuations, Hydrology, Hydrometry, River basins, Drainage area, Surface waters, *South Dakota, *Flow gaging station, Average available flow, *Seasonal flow fluctuations, Median flow rates, White River(SD), Little White River(SD), Vermillion River(SD).

Flow-duration tables were prepared for 81 flow gaging stations on South Dakota rivers and streams. Flow frequency for each one-third month period throughout the year and the seasonal variation in streamflow were determined. Peak flows in the rivers and streams occurred during the spring; flows decreased through the summer and fall, reaching a minimum during mid-winter. (Extended periods of zero flow during the winter are common). Low or zero flows for extended periods were the limiting factors for the development of rivers and streams for beneficial uses, e.g., public water supply, irrigation, fish propagation, and recreation. Natural water quality varied inversely with streamflow; the greatest concentration of dissolved solids occurred during the low-flow season from November through February. Low dissolved oxygen concentration in a major river locted downstream from a large discharge of treated wastewater was associated with low flows during the high-temperature summer period and the winter ice-cover period. Studies of White River Basin relating historical low-flow frequencies to the permitted withdrawals of irrigators reveal that there would have been insufficient flow in the river for a large percentage of the irrigation season if the irrigators had continuously withdrawn the quantity of water allowed by their permit. Average available flows for specific stream uses are more precisely defined by median flow (50%) than by mean flow. Flow-duration tables, included for 3 rivers, adequately describe South Dakota seasonal flow conditions. (Seip-IPA)
W78-05356

AUTORUN ANALYSIS OF HYDROLOGIC TIME SERIES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power.
Z. Sen.
Journal of Hydrology, Vol 36, No 1/2, p 75-85, January 1978. 5 fig, 2 tab, 12 ref.

Descriptors: *Hydrology, *Time series analysis, Analytical techniques, Flow, Runoff, *Correlation analysis, Persistence, Statistics, Mathematics, Markov processes, Rivers, Streamflow, Methodology, *Autocorrelation analysis, *Autorun analysis.

A new methodology, which is referred to as the 'autorun analysis,' was developed to investigate the seyuential properties of a hydrologic time series. The relevance of the methodology as a potential tool in water-engineering applications, as well as in statistics, is due to its distribution-free behavior. The autorun analysis yields the same results as those of the autocorrelation analysis in the case of normally distributed random variables only. An application of the autorun analysis to some mean annual flow series was performed. (Sims-ISWS)
W78-05386

PERTURBATION SOLUTION OF SPATIALLY VARIED FLOW IN OPEN CHANNELS,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-05389

THE INFLUENCE OF CLIMATE ON FLOODS IN SMALL BASINS, AS DEFINED BY RAINFALL-RUNOFF MODELING,
Geological Survey, Reston, VA. Water Resources Div.
R. W. Lichty, and F. Liscum.
In: Second Conference on Hydrometeorology, October 25-27, 1977, Toronto, Ontario, Canada.

Published by American Meteorological Society, Boston, Massachusetts, p 124-131, 1977. 3 fig, 5 tab, 13 ref.

Descriptors: *Floods, *Model studies, *Climatic data, *Rainfall-runoff relationships, Flood frequency, Regional analysis, Regression analysis, Synthetic hydrology, Mathematical models, Hydrology.

The purpose of this report is twofold: First, to quantify the spatially varying influence of climate, C, as it affects floods from small basins, and secondly, to show its significance in relation to other important factors in a regional flood analysis. A rainfall-runoff model was used to generate a sample of 50 synthetic annual flood series using data at each of 33 rainfall sites. A flood-frequency curve was developed for each flood series and synthetic, 2-year floods were defined. Through regression, a generalized definition of synthetic, 2-year floods, as a function of model parameters, was developed for each one of the rainfall sites. The site-to-site variability of the regression constant, C, reflects the spatially varying influence of local climatic factors on synthetic floods. A contour map depicting the spatial variability of C was prepared and its utility in a regional flood frequency analysis was varified using observed flood peak records for a sample of 98 small basins located in Missouri, Illinois, Tennessee, Mississippi, Alabama, and Georgia. The relative significance of the climatic factor in explaining the variability of observed floods is discussed in relation to size of drainage area, a hydrograph shape factor, and an infiltration factor. (Woodard-USGS)
W78-05423

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70--PART 16. HAWAII AND OTHER PACIFIC AREAS.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05431

TECHNIQUES FOR ESTIMATING FLOOD-DEPTH FREQUENCY RELATIONS ON NATURAL STREAMS IN GEORGIA,
Geological Survey, Doraville, GA. Water Resources Div.
M. Price.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-275 381, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 77-90, August 1977. 33 p, 8 fig, 3 tab, 8 ref.

Descriptors: *Flood forecasting, *Depth-area curves, *Flood frequency, *Estimating, *Georgia, Streams, Natural flow, Regression analysis, Flood data, Gaging stations, Flow rates, Drainage area, *Flood-depth probability, Basin characteristics.

Regional relations are defined for estimating depth of floods having recurrence intervals of 10, 50, and 100 years on streams with natural flow in Georgia. Multiple-regression analysis of station data is used to define the relations between flood depths and frequency for streams draining from 1 to 1,000 square miles, and for 10 climatological and physical basin characteristics. The analysis indicates that the drainage area of the basin is the most significant variable. Five regions having distinct flood-depth frequency characteristics are delineated. The developed relations, expressed as equations and graphs, are considered usable for any site in Georgia where the drainage area is between 1 and 1,000 square miles, and the flow is natural; exceptions include streams that are urbanized, regulated, tide affected, channelized, or where manmade structures significantly affect peak stages. (Woodard-USGS)
W78-05443

STRATIFICATION AND OPEN CHANNEL FLOW,
Vanderbilt Univ., Nashville. TN. Dept. of Environmental Engineering and Policy Management.
For primary bibliographic entry see Field 8B.
W78-05566

TRANSVERSE BED SLOPES IN CURVED ALLUVIAL STREAMS,
Karlsruhe Univ. (West Germany). Inst. fuer Hydromechanik.
For primary bibliographic entry see Field 8B.
W78-05567

EFFECT OF CHANNEL MEANDERS ON FLOOD STAGE IN VALLEY,
Saskatchewan Univ., Saskatoon. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-05568

TEMPERATURE AND MISSOURI RIVER STAGES NEAR OMAHA,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. W. Shen, W. J. Mellema, and A. S. Harrison.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 104, No. HY1, Proceedings Paper 13460, p 1-20, January 1978. 8 fig, 3 tab, 26 ref, 2 append.

Descriptors: *Missouri River, *Stage-discharge relations, *Nebraska, *On-site data collections, Rivers, Water temperature, Water levels, Data collections, Analysis, Roughness(Hydraulic), Flow resistance, Sediment transport, Velocity, Streambeds, River beds, Alluvial channels, Navigable rivers, River flow, Sediments, Particle size, Omaha(Neb).

A pronounced correlation between water temperature, shifts in the stage-discharge relationship, and bed roughness forms in the Missouri River near Omaha was reported by the Army District after conducting a comprehensive data collection program in 1966-1969 and 1975 in a 7-mile reach of the Missouri River. This paper presented and analyzed field data collected in this research. It was found that the form resistance curve proposed by Einstein and Barbarossa can be used to describe the flow resistance and that the bed form prediction diagram presented by Vanoni is very applicable. Based on Vanoni's curve, a criterion was developed to predict the change of bed form in the Missouri River near Omaha due to river temperature. (See also W74-05735) (Humphreys-ISWS)
W78-05569

THEORETICAL ESTIMATIONS OF FLOOD ROUTING PARAMETERS,
Northeastern Univ., Boston, MA. Dept. of Civil Engineers.
For primary bibliographic entry see Field 8B.
W78-05572

ADSORPTION LOSSES AND PERFORMANCE OF 51CR-EDTA AND 198AU IN TRACING OF FLOOD RUNOFF,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
D. H. Pilgrim.
Journal of Hydrology, Vol. 36, No. 1/2, p 47-64, January 1978. 6 fig, 3 tab, 22 ref.

Descriptors: *Runoff, *Tracers, *Watersheds(Basins), *Australia, *Radioisotopes, *Chromium radioisotopes, Gold, *Gold radioisotopes, Floods, Flow, Hydrographs, Precipitation(Atmospheric), On-site investigations, Hydrology, Adsorption, Performance.

Flood runoff on a 0.39-sq km catchment was traced using 51Cr-EDTA and 198Au. A rigorous method was developed for computing the total activities of tracer passing the monitoring site at the catchment outlet, and conditions required for valid application were examined. Proportions of tracer reaching the monitoring site were determined for 44 tracing runs from seven injection sites. The results indicated that 51Cr-EDTA is a good tracer, but that large losses of 198Au occurred, although both tracers performed satisfactorily in terms of the overall objectives of the study. Adsorption losses are related to the time of travel of the tracer, the length of channels over which the runoff was traced, the dispersion of the tracer, and the flood discharge. All of these factors are interrelated. Most of the adsorption losses occurred near the injection sites. Hydrological processes also were shown to account for some of the tracer losses. (Sims-ISWS)
W78-05573

A BAYESIAN APPROACH TO MULTIVARIATE HYDROLOGIC SYNTHESIS,
Massachusetts Inst. of Tech., Cambridge Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 8B.
W78-05586

CALCULATION OF FLOOD DISCHARGES AND FLOOD HYDROGRAPHS IN KANSAS,
Kansas Univ./Center for Research, Inc., Lawrence.
R. L. Smith, and G. E. Hauser.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 118, Price codes: A08 in paper copy, A01 in microfiche. Report No. FHWA-KS-RD-75-1, January 1976. 171 p, 38 fig, 5 tab, 2 append.

Descriptors: *Flood frequency, *Kansas, *Flood discharge, Floods, Hydrography, Discharge(Water), Watersheds(Basins), Hydrology, Model studies, Equations, *Non-linear hydrographs, Modified rational formula, Rational formula.

Specific design methodologies were developed for: (1) calculation of flood frequency relationships for both rural land and urban conditions, and (2) calculation of flood hydrographs for specified frequencies. The recommended procedures were based on the Frequency Equivalent Non-Linear Hydrograph (FENL-H) method developed at the University of Kansas. FENL-H utilizes a form of the modified rational formula Q = XZA, where Q = peak discharge in cfs, X = rainfall excess rate in in/hr, Z is the ratio of peak discharge to the equilibrium discharge, and A is the drainage area in acres. The time of concentration and the time of equilibrium were presumed to be equal. Application of the FENL-H model to 110 Kansas basins for which peak discharge records were available during a common 17 year period clearly showed that the time of concentration decreases as the rate of rainfall excess increases. The data also indicated that the bulk of the unexplained variance in current flood frequency equations in Kansas can be attributed to a very nominal variance in the frequency distributions of the input rainfall. It is believed that the design procedures presented in the report are applicable to watersheds ranging in size from 400 acres to 500 sq mi. (Lee-ISWS)
W78-05592

EVALUATION OF FLOOD RISK FACTORS IN THE DESIGN OF HIGHWAY STREAM CROSSINGS. VOL III. FINITE ELEMENT MODEL FOR BRIDGE BACKWATER COMPUTATION,
Water Resources Engineers, Springfield, VA.
For primary bibliographic entry see Field 8B.
W78-05596

2F. Groundwater

MODELLING OF LARGE MULTILAYERED AQUIFER SYSTEMS: THEORY AND APPLICATIONS,
Ecole National Superieure des Mines de Paris, Fontainebleau (France). Center for Geological Information.
G. De Marsily, E. Ledoux, A. Levassor, D. Poitrinal, and A. Salem.
Journal of Hydrology, Vol 36, No 1/2, p 1-34, January 1978. 7 fig, 17 ref.

Descriptors: *Aquifers, *Model studies, *Artesian aquifers, Mathematical models, Aquitards, Aquicludes, Groundwater, Groundwater movement, Velocity, Piezometry, Geology, Hydrogeology, Irrigation, Hydrology, *Algeria, *Oued R'hir aquifer(Algeria).

The paper presented flow mechanisms in large sedimentary basins, with a distinction between the behavior of aquifers and aquitards. Taking advantage of this difference, a discretization method was presented, with nesting square meshes of variable size in quasi three dimensions. A finite-differences technique gave a method for solving the flow equations on this discretized flow domain. An application of the method in the northern Sahara was presented, with special emphasis on the use of the model to optimize the exploitation of groundwater resources. Also, problems of mass transport in such systems were outlined. (Sims-ISWS)
W78-05384

DETERMINATION OF AQUIFER PARAMETERS BY A TWO-WELL PULSED METHOD USING RADIOACTIVE TRACERS,
UKAEA Hydrology and Coastal Sediment Group, Harwell (England).
M. Ivanovich, and D. B. Smith.
Journal of Hydrology, Vol 36, No 1/2, p 35-45, January 1978. 6 fig, 1 tab, 9 ref.

Descriptors: *Aquifers, *Groundwater movement, *Tracers, *Model studies, Mathematical models, Radioisotopes, Bromines, Wells, Water wells, Boreholes, Groundwater, Permeability, Dispersion, Hydrology, Geohydrology, Chalk aquifers, Tracer studies.

A pilot investigation of the behavior of water in a series of boreholes in the Chalk aquifer using 82Br as tracer was described. The method consisted of an instantaneous injection of the tracer into one borehole and subsequent measurement of the tracer concentration in the water abstracted from a neighboring borehole as a function of time. This paper presented the field data, the results of the data analysis using a simple statistical model to describe the shape of the observed pulse, and proposals for the future work deemed necessary to provide hydrological information about the behavior of groundwater in the Chalk using a two-well pulsed method. (Sims-ISWS)
W78-05385

DRAINAGE BY RECHARGE WELLS IN A LEAKY AQUIFER,
Indian Inst. of Tech., Kharagpur. Dept. of Agricultural Engineering.
P. K. Chowdhury, S. K. Shakya, and B. Anjaneyulu.
Journal of Hydrology, Vol 36, No 1/2, p 87-93, January 1978. 1 fig, 1 ref.

Descriptors: *Recharge wells, *Aquifers, *Model studies, Mathematical models, Recharge, Equations, Artificial recharge, Groundwater, Groundwater movement, Water levels, Potentiometric level, Infiltration, Hydraulic conductivity, Soils, Artesian aquifers, Confined water, Hydrology.

Theoretical solutions were developed for predicting the rate of recharge through a well in a leaky aresian aquifer overlain by an unconfined aquifer of limited areal extent. The ground surface was considered to be waterlogged. Solution to the basic steady-state differential equation was presented. The solution can be used to compute the recharge rate on the basis of aquifer characteristics and the steady infiltration rate of the soil. (Sims-ISWS)
W78-05387

FLOW TOWARD A PARTIALLY PENETRATING WELL IN A BOUNDED ARTESIAN AQUIFER,
Indian Inst. of Tech., Madras (India). Hydraulic Engineering Lab.
M. H. Abdul Khader, and D. Ramadurgaiah.
Journal of Hydrology, Vol 36, No 1/2, p 95-107, January 1978. 6 fig, 1 tab, 16 ref.

Descriptors: *Artesian aquifers, *Groundwater flow, *Model studies, Mathematical models, Aquifers, Confined water, Groundwater, Recharge, Water levels, Pumping, Water wells, Drawdown, Flow, Hydrology, Partially penetrating wells.

A more realistic theoretical solution to the problem of artesian well flow was developed, taking into consideration the partial penetration of the well and the finiteness of its radius. The aquifer was assumed to be homogeneous, anisotropic, confined between horizontal, impervius boundaries, and bounded laterally by a recharge boundary of uniform radius. Important results of the analysis were discussed, both in the transient and the steady-states of flow, with reference to the solutions of the previous investigators. (Sims-ISWS)
W78-05388

NON-DARCY FLOW AND ITS IMPLICATIONS TO SEEPAGE PROBLEMS,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Civil Engineering.
P. Basak.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 103, No IR4, Proceedings Paper 13442, p 459-473, December 1977. 9 fig, 4 tab, 44 ref.

Descriptors: *Drainage, *Seepage, *Darcys law, Porous media, Confined water, Analytical techniques, Hydraulics, Equations, Flow, Discharge(Water), *Non-Darcy flow, Drainage spacing, Nonlinear velocity-gradient response.

Analytical solutions for the problems of drainage spacing in a ditch drainage system and steady-state seepage through confined aquifer of variable thickness incorporating Izbash's nonlinear velocity-gradient response v=M times i to the nth power were presented. The effecr on nonlinearity in the flow response on the drainage spacing, discharge characteristics, and piezometric pressure distribution in relation to the corresponding Darcian linear case was brought out. The solutions derived showed that nonrecognition of even a weak non-Darcy flow would lead either to an uneconomical or an unsafe 8depending on the value of non-Darcy parameter n) drainage spacing for ditch drainage problems and would lead to considerable over or under prediction of discharge for confined aquifer problem. Apart from the previously mentioned analytical soluions, a perspective view of non-Darcy flow through porous media was incorporated, and its importance in various drainage projects was examined. (Lee-ISWS)
W78-05392

POTENTIAL FOR LAND SUBSIDENCE DUE TO REDUCTION OF ARTESIAN HEAD IN THE ATLANTIC COASTAL PLAIN,
Geological Survey, Reston, VA. Water Resources Div.
G. H. Davis.
In: Hydraulics in the Coastal Zone; Proceedings of the 25th Annual Hydraulics Division Specialty Conference, held at Texas A & M University, College Station, August 10-12, 1977: American Society of Civil Engineers, p 152-160, 1977. 4 fig, 7 ref.

Descriptors: *Land subsidence, *Drawdown, *Artesian heads, *Artesian aquifers, *Atlantic Coastal Plain, Hydrogeology, Regional analysis, Aquifer characteristics, Withdrawal, Hydraulic properties, Georgia, *Savannah area(Geo).

This paper focuses on the potential for land subsidence due to reduction of head in artesian aquifers of the Atlantic Coastal Plain. The Atlantic Coastal Plain is characterized by a wedge of unconsolidated to poorly consolidated sediments thickening seaward from zero along the Piedmont Border to several thousand meters beneath the offshore continental shelf. In much of the Coastal Plain surface-water supplies are ample for municipal and industrial needs and ground water is little used in comparison to its potential, but where confined ground water is overdrawn the resulting decline in artesian head can be expected to cause compaction of fine unconsolidated or partly consolidated sediments and consequently subsidence of the land surface. The best documented use of land subsidence on the Atlantic Coastal Plain is that of Savannah, Georgia where decline in artesian head, mainly between 1935 and 1965, in the principal artesian aquifer, a limestone sequence of Tertiary age, has resulted in subsidence of as much as 270 mm. Subsidence is continuing unabated at a maximum rate of 4 mm per year even though the head decline has stabilized. (Woodard-USGS)
W78-05422

AVAILABILITY OF GROUND WATER IN SEMINOLE COUNTY AND VICINITY, FLORIDA,
Geological Survey, Orlando, FL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05426

SUMMARY GROUND-WATER RESOURCES OF LANCASTER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-05432

GROUND-WATER LEVELS IN THE UNITED STATES, 1974. SOUTHEASTERN STATES.
Geological Survey, Reston, VA. Water Resources Div.
Available from the Branch of Distribution, USGS, 1200 S. Eads St., Arlington, VA 22202, price $2.25. Water-Supply Paper 2165, 1977. 116 p, 12 fig.

Descriptors: *Water levels, *Groundwater, *Water wells, *Well data, *Southeast U.S., Measurement, Basic data collections, Aquifers, Alabama, Florida, Georgia, Kentucky, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia.

This report was prepared from ground-water levels measured during 1974 by the U.S. Geological Survey in cooperation with the States of Alabama, Florida, Georgia, Kentucky, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia, and with other agencies. Water-level measurements in wells are given in feet with reference to either mean sea level or land-surface datum. Mean sea level is the datum plane on which the national network of precise levels is based; land-surface at each well. If known, the altitude of the land-surface datum above mean sea level is given in the well description. The height of the measuring point above or below land-surface datum is given in each well description. (Woodard-USGS)
W78-05433

GROUND-WATER LEVELS IN THE UNITED STATES, 1971-74. NORTHWESTERN STATES.
Geological Survey, Reston, VA. Water Resources Div.
Available from the Branch of Distribution, USGS, 1200 S. Eads St., Arlington VA 22202, Price $2.50. Water-Supply Paper 2161, 1977. 153 p, 9 fig.

Descriptors: *Water levels, *Groundwater, *Water wells, *Well data, Measurement, Basic data collections, Aquifers, Alaska, Colorado, Idaho, Montana, Oregon, Utah, Washington, Wyoming, *Pacific Northwest U.S.

This report was prepared ffom ground-water levels measured during 1971-74 by the U.S. Geological Survey in cooperation with the States of Alaska, Colorado Idaho, Montana, Oregon, Utah, Washington, and Wyoming, and with other agencies. Water-level measurements in wells are given in feet with reference to either mean sea level or land-surface datum. Mean sea level is the datum plane on which the national network of precise levels is based; land-surface datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the land-surface datum above mean sea level is given in the well description. The height of the measuring point above or below land-surface datum is given in each well description. (Woodard-USGS)
W78-05434

GROUND-WATER RESOURCES OF CAMBODIA,
Geological Survey, Reston, VA. Water Resources Div.
W. C. Rasmussen, and G. M. Bradford.
Available from the Branch of Distribution, USGS, 1200 S. Eads St., Arlington, VA 22202, Price $3.75. Water-Supply Paper 1608-P, 1977. 122 p, 5 fig, 3 plates, 26 tab, 14 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Hydrogeology, *Well data, *Asia, Foreign projects, Water wells, Water levels, Pumping, Water yield, Geology, Groundwater movement, Rainfall, Groundwater recharge, Water quality, *Cambodia.

Cambodia (now the Khmer Republic), in tropical, humid southeast Asia, has an area of 175,630 sq km and a population of about 5 million. During 1960-63, 1,103 holes were drilled in 16 of the 18 khets (provinces), of which 795 or approximately 72 percent, were productive wells at rates ranging from 1.1 to 2,967 liter/min. The productive wells ranged in depth from 2 to 209.4 meters and were 23.2 meters deep on the average. The principal aquifer tapped by drilled wells in Cambodia is the Old Alluvium. In many places, however, dug wells and a few shallow drilled wells obtain water from the Young Alluvium. Sandstone of the Indosinias Formation yields moderate to small quantities of water to wells in a number of places. Also, wells tapping water-bearing basalt have a small to moderate yield. The quality of water is recorded in only a few analyses. The dissolved-solids concentrations are generally low and the water is usable for most purposes without treatment. Some well waters, however, are high in iron and would have to be aerated and filtered before use. Well records are tabulated, and the geology and hydrology is discussed by khets. (Woodard-USGS)
W78-05435

AQUIFER TEST ANALYSES FOR THE FLORIDAN AQUIFER IN FLAGLER, PUTNAM, AND ST. JOHNS COUNTIES, FLORIDA,
Geological Survey, Tallahassee, FL. Water Resources Div.
C. B. Bentley.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-275 790, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 77-36, 1977. 50 p, 29 fig, 2 tab, 27 ref.

Descriptors: *Aquifer characteristics, *Confined water, *Leakage, *Storage coefficient, *Transmissivity, Florida, Artesian wells, Drawdown, Water yield, Groundwater recharge, Water wells, Hydrogeology, Ground movement, Potentiometric level, Aquifer testing, Irrigation, Saline water intrusion, *Floridan aquifer, Flagler County, Putnam County, St. Johns County.

The Floridan aquifer in Flagler, Putnam, and St. Johns Counties of northeastern Florida consists primarily of limestone beds of the Ocala Group and the underlying Avon Park and Lake City Limestones, all of Eocene age. New data from eighteen aquifer tests were analyzed for transmissivity, storage coefficient, and leakance. In addition, the data and results of several tests made previously were analyzed and used to determine hydraulic characteristics of the Floridan aquifer. The analyses indicate that the aquifer has a transmissivity of about 60,000 feet squared per day and a storage coefficient of about 0.0008. Leakance, a property of the overlying and underlying confining beds, ranges from 0.00023 day northwest of Palatka to 0.016 day in the farming area near East Palatka. The transmissivity, storage coefficient, and leakance can be used to generate curves showing drawdown with time at any distance from a well that is discharging at any selected constant rate and at any depth of penetration into the aquifer. A method is outlined whereby the total amount of well discharge in the farming area near Hastings can be estimated on a seasonal and on an annual basis. This estimate can be compared with actual discharge figures, when they become available, to compute an estimate of the amount of leakage into the aquifer. (Woodard-USGS)
W78-05437

RECONNAISSANCE OF GROUND-WATER RESOURCES IN THE MOUNTAIN HOME PLATEAU AREA, SOUTHWEST IDAHO,
Geological Survey, Boise, ID. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-05438

STREAM SIMULATION IN AN ANALOG MODEL OF THE GROUND-WATER SYSTEM ON LONG ISLAND, NEW YORK,
Geological Survey, Mineola, NY. Water Resources Div.
A. W. Harbaugh, and R. T. Getzen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-275 369, Price codes: A02 in paper copy, A01 in microfiche. Water-Resources Investigations 77-58, September 1977. 15 p, 6 fig, 7 ref.

Descriptors: *Surface-groundwater relationships, *Groundwater movement, *Analog models, *New York, Water table, Elevations, Hydraulic gradient, Channel morphology, Streambeds, Hydrogeology, Seepage, Model studies, Simulation analysis, Methodology, *Long Island(NY).

The stream circuits of an electric analog of the ground-water system of Long Island, NY, were modified to more accurately represent the relationship between streamflow and ground-water levels. Assumptions for use of the revised circuits are (1) that streams are strictly gaining, and (2) that ground-water seepage into the streams is proportional to the difference between streambed elevation and the average water-table elevation near the stream. No seepage into streams occurs when ground-water levels drop below the streambed elevation. Regional simulation of the 1962-68 drought on Long Island was significantly improved by use of the revised stream circuits. (Woodard-USGS)
W78-05440

GROUND WATER IN THE KOEHN LAKE AREA, KERN COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-05442

TEHM: A TERRESTRIAL ECOSYSTEM HYDROLOGY MODEL,
Oak Ridge National Lab., TN. Environmental Sciences Div.
For primary bibliographic entry see Field 2G.
W78-05565

DISPERSIVE SOURCES IN UNIFORM GROUND-WATER FLOW,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-05571

NUMERICAL ANALYSIS OF ONE-DIMENSIONAL DECAY OF A PERCHED WATER TABLE,
Mississippi Agricultural and Forestry Experiment Station, Mississippi State.
K. K. Watson, F. D. Whisler, and A. A. Curtis.
Journal of Hydrology, Vol. 36, No. 1/2, p 109-119, January 1978. 10 fig, 1 tab, 8 ref.

Descriptors: *Soil water, *Soil water movement, *Groundwater, *Model studies, Mathematical models, Groundwater movement, Soils, Porous media, Sands, Loam, Flow, Moisture content, Hydraulic conductivity, Drainage, Water levels, Capillary fringe, Hydrology.

A numerical solution of the differential equation for the flow of water in unsaturated porous materials was used to study the one-dimensional decay of a perched water table. The perched condition results from the presence of a thin layer of less permeable material existing at the base of a homogeneous profile. Botany sand and Touchet silt loam were used in the analysis, and, for each material, eight cases were considered. These cases represent different thicknesses and saturated hydraulic conductivities of the impeding layer. The dimensionless outflow-time relationship was derived for each case, and typical pressure head profiles were presented. The downward movement of the top of the capillary fringe and the fall of the water table with time also were discussed. (Sims-ISWS)
W78-05574

A LAYERED INFILTRATION MODEL FOR HOMOGENEOUS SOILS,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W78-05575

THE COMPUTATION OF LEAKY AQUIFER FUNCTIONS,
Tulsa Univ., OK. Dept. of Petroleum Engineering.
G. W. Thomas, K. G. Keys, and A. C. Reynolds, Jr.
Journal of Hydrology, Vol. 36, No. 1/2, p 173-178, January 1978. 12 ref.

Descriptors: *Pumping, *Aquifers, *Model studies, *Mathematical models, Mathematics, Equations, Numerical analysis, Simulation analysis, Hydrology, *Leaky aquifer functions, Hantush function, Mathematical solutions, Computations.

A stable accurate method for computing leaky aquifer functions was presented and discussed. (Sims-ISWS)
W78-05583

VARIABLE THICKNESS TRANSIENT GROUNDWATER FLOW MODEL THEORY AND NUMERICAL IMPLEMENTATION,
Battelle Pacific Northwest Labs., Richland, WA.
K. L. Kipp, A. E. Reisenauer, C. R. Cole, and C. A. Bryan.
Available from the National Technical Information Service, Springfield, VA 22161 as BNWL-1703, Price codes: A04 in paper copy, A01 in microfiche. Report No. BNWL-1703/UC-11, 1976. 40 p, 18 fig, 10 ref, 4 append. ERDA AT(45-1)-2130.

Descriptors: *Washington, *Water table aquifers, *Computer models, *Waste disposal, Unsteady flow, Heterogeneity, Groundwater potential, Groundwater, Injection wells, Permeability, Aquifers, Equations, Model studies, Boussinesq equation, Finite difference analysis, Model verification.

Mathematical simulation of two-dimensional flow in an unconfined aquifer was accomplished using the nonlinear, transient Boussinesq equation with appropriate initial and boundary conditions. The heterogeneous permeability (hydraulic conductivity) distribution was derived by solution of the Boussinesq equation along instantaneous streamtubes of flow employing a measured water table surface and a limited number of field-measured hydraulic conductivity values. Use of a successive line over-relaxation technique with unequal time steps resulted in a more rapid convergence of the numerical solution than with previous techniques. A comparison of calculated and measured water table elevations was made at specific well locations, and the quality of the verification simulation was evaluated using a data retrieval and display system. Agreement between the model results and measured data was good over two-thirds of the Hanford Reservation. The capability of the model to simulate flow with time-varying boundary conditions, complex boundary shapes, and a heterogeneous distribution of aquifer properties was demonstrated. (Adams-ISWS)
W78-05584

2G. Water In Soils

STUDY ON THE STATE OF WATER IN DISPERSIONS OF H+, MG2+ AND FE3+ MONTMORILLONITES BY HIGH-RESOLUTION NMR, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics; and Moscow State Univ. (USSR). Dept. of Soil Melioration.
For primary bibliographic entry see Field 2K.
W78-05238

PRESERVING THE ENVIRONMENT OF A SANDHILLS REGION CONCURRENT WITH INTENSIVE IRRIGATION DEVELOPMENT,
Nebraska Univ., Lincoln. Water Resources Center.
For primary bibliographic entry see Field 3F.
W78-05348

LIQUEFACTION POTENTIAL OF DAMS AND FOUNDATIONS REPORT 3: DEVELOPMENT OF AN ELASTIC-PLASTIC CONSTITUTIVE RELATIONSHIP FOR SATURATED SAND,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavements Lab.
For primary bibliographic entry see Field 8D.
W78-05368

INCREASE IN ABUNDANCE OF SOLIDAGO SEMPERVIRENS ON A DIKED SALT MARSH IN SOUTHWESTERN CONNECTICUT,
Fairfield Univ., CT. Dept. of Biology.
B. Frankowski, F. Hernandez, T. Okon, and S. Bongiorno.
Bulletin of the Torrey Botanical Club, Vol 104, No 4, p 383-385, October-December, 1977. 2 fig, 14 ref.

Descriptors: *Coastal marshes, *Soil salinity, Wetlands, *Connecticut, Topography, *Salt marshes, *Seaside goldenrod, *Diked salt marsh, Spartina patens, Increase in abundance.

Although water content of the soil did not differ significantly between the diked and a natural marsh, soil salinity was much lower in the diked marsh. This is probably a result of leaching by precipitation. Salinity was also negatively correlated with elevation within the diked marsh. Seaside goldenrod increased in abundance on the slightly higher and less saline portions of the marsh. Some patches covered 400-1000 sq m. Once salinity is lowered, seaside goldenrod can successfully out-compete Spartina patens. (Stihler-Mass)
W78-05518

TEHM: A TERRESTRIAL ECOSYSTEM HYDROLOGY MODEL,
Oak Ridge National Lab., TN. Environmental Sciences Div.
D. D. Huff, R. J. Luxmoore, J. B. Mankin, and C. L. Begovich.
Report EDFB/IBP-76/8, ORNL/NSF/EATC-27, April 1977, 152 p, 30 fig, 20 tab, 60 ref. W7405-eng-26.

Descriptors: *Model studies, Hydrology, Runoff, Flow, *Soil water, *Ecosystems, Throughfall, *Infiltration, Evaporation, Transpiration, Drainage, Root zone.

The model described combines mechanistic models for climatic and hydrologic processes to simulate interception and throughfall; infiltration; root zone evaporation, transpiration, and drainage; plant and soil water potential; unsaturated and saturated subsurface flow; surface runoff; and open channel flow. Walker Branch Watershed on the Oak Ridge Reservation was used as an example to illustrate development of the input parameters and variables needed to execute the TEHM. (Chilton-ORNL)
W78-05565

NUMERICAL ANALYSIS OF ONE-DIMENSIONAL DECAY OF A PERCHED WATER TABLE,
Mississippi Agricultural and Forestry Experiment Station, Mississippi State.
For primary bibliographic entry see Field 2F.
W78-05574

A LAYERED INFILTRATION MODEL FOR HOMOGENEOUS SOILS,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
M. A. Gill.
Journal of Hydrology, Vol. 36, No. 1/2, p 121-131, January 1978. 4 fig, 1 tab, 8 ref.

Descriptors: *Infiltration, *Soil water movement, *Model studies, Mathematical models, Soils, Porous media, Soil water, Hydraulic conductivity, Laboratory tests, Saturated flow, Zone of saturation, Unsaturated flow, Groundwater, Groundwater flow, Flow, Hydrology.

A modification of the Green-Ampt equation for one-dimensional vertical infiltration into homogeneous soils was proposed. Infiltration was conceived to be occurring in a two-layered soil consisting of saturated and unsaturated zones. The predictions from the proposed model are in good agreement with Philip's results for infiltration into Yolo light clay. (Sims-ISWS)
W78-05575

THE INFLUENCE OF CATION EXCHANGE AND GYPSUM SOLUBILITY ON THE TRANSPORT OF SODIUM, CALCIUM AND SULPHATE THROUGH SOILS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
C. G. E. M. VanBeek, and R. Pal.
Journal of Hydrology, Vol. 36, No. 1/2, p 133-142, January 1978. 3 fig, 2 tab, 12 ref.

Descriptors: *Cation exchange, *Dispersion, *Laboratory tests, *Model studies, Mathematical models, Computer models, Solutes, Chemicals, Cations, Sodium, Calcium, Sulphates, Soils, Soil water, Gypsum, Chemistry, Soil physics, Soil chemistry.

Reported herein was the comparison of the breakthrough curves of various ions as determined experimentally and computerized according to the continuous simulation modelling program in the case of an experiment conducted using a column comprising carborundum, resin, and gypsum when percolated with different concentrations of different salts taken one after another. The agreement seems to be reasonably good. The deviation between the two curves was attributed to dispersion/diffusion not taken into account in the computer program. The dispersion coefficient as estimated from the chloride data was found to agree very well with the numerical dispersion coefficient. (Sims-ISWS)
W78-05576

THE STRATIGRAPHY AND GEOMORPHOLOGY OF THE HOFMANN FOREST POCOSIN,
Soil Conservation Service, Raleigh, NC. and North Carolina State Univ. at Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 2H.
W78-05577

ESTIMATION OF THE SPATIAL VARIABILITY OF THE SOIL WATER FLUX,
Florida Univ., Gainesville. Dept. of Soil Science.
P. S. C. Rao, P. V. Rao, and J. M. Davidson.
Soil Science Society of America Journal, Vol 41, No 6, p 1208-1209, November-December 1977. 1 tab, 4 ref. EPA-R-803067.

Descriptors: *Soil water movement, *Flow, *Model studies, Mathematical models, Equations, Monte Carlo method, Simulation analysis, Variability, Hydrology, Properties, Hydraulic conductivity, Moisture content, Soil water, *Microhydrologic properties, Taylor series expansion.

A simple method for estimating the spatial variability of the soilwater flux from known variability of soil microhydrologic properties was presented. The method is based on the theory of approximating a differentiable function using Taylor-series expansion. Published data for means and variances of the soil microhydrologic properties were used to estimate the mean and variance of the soil water flux in a draining profile of Panoche soil. These values were compared with those estimated using a Monte Carlo simulation procedure on the same set of data. Relative advantages and disadvantages of these two methods were discussed briefly. (Sims-ISWS)
W78-05578

FIELD MEASUREMENT OF DENITRIFICATION,
California Univ., Davis. Dept. of Land, Air and Water Resources.
For primary bibliographic entry see Field 5A.
W78-05619

AREAS OF FAULTING AND POTENTIALLY UNSTABLE SEDIMENTS IN THE ST. GEORGE BASIN REGION, SOUTHERN BERING SEA,
Geological Survey, Menlo Park, CA.

For primary bibliographic entry see Field 2J.
W78-05637

2H. Lakes

MATHEMATICAL MODELLING OF LIMNIC ECOSYSTEMS WITH RECURSIVE ESTIMATION METHODS, (IN GERMAN),
J. Gnauk, J. Wernstedt, and W. Winkler.
Int Rev Gesamten Hydrobiol 61(5), p 609-626, 1976.

Descriptors: Chlorophyll, *Ecosystems, *Mathematical models, Oxygen, *Recursive estimation method, Seston, Temperature, Reservoirs.

Limnic ecosystem models have been described by means of differential equations and time stationary statistical methods. But an accurate description of the ecosystem processes is only possible by time varying methods. Approaching deterministic techniques often leads to hardly computable nonlinear differential equations with disturbed parameters. Recursive estimation methods for ecosystems modeling in real-time are presented and the 1st results of the application to Saidenbach reservoir (East German) are given. The O2 balance of the surface and of 2 layer (depth 10 and 35 m) of the reservoir was modeled. The structue of all models was p-canonic with O2 as output and temperature, oxygen deficiency (BOD-2) (biological oxygen demand) seston, chlorophyll, NO3-N COD (Mn) (chemical oxygen demand), phosphate (PO4) as inputs on each level. For surface model the Seechi disk-transparency was used as an additional input.--Copyright 1977, Biological Abstracts, Inc.
W78-05237

STUDY OF THE ECOLOGY OF IRON BACTERIA OF FRESH WATER RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow, Inst. Mikrobiologii.
For primary bibliographic entry see Field 5C.
W78-05269

BIOGEOCHEMISTRY OF DEEP LAKES IN THE CENTRAL ALASKAN RANGE,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 5A.
W78-05358

LOCALISED DESTRATIFICATION OF LARGE RESERVOIRS TO CONTROL DISCHARGE TEMPERATURES,
Victoria State Rivers and Water Supply Commission, Melbourne (Australia).
For primary bibliographic entry see Field 8B.
W78-05370

HYDRODYNAMICS OF BUBBLE PLUMES AND OXYGEN ABSORPTION IN STRATIFIED IMPOUNDMENTS,
College of Petroleum and Minerals, Dharan (Saudi Arabia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-05371

NATURAL LAKE WATER TEMPERATURES IN THE NEARSHORE WATERS OF SOUTHEASTERN LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
E. Seibel, and J. C. Ayers.
Journal of Great Lakes Research, Vol 3, No 1-2, p 1-9, October 1977. 4 fig, 6 tab, 15 ref.

Descriptors: *Water temperature, *Lake Michigan, *Fluctuations, *Great Lakes, *Thermal properties, *Temperature, Physical properties, Thermal pollution, Water properties, Aquatic life, Properties, Thermal capacity, Lakes, Surface water, Aquatic environment, *Temperature fluctuation.

A five-year study of the lake-water temperature of southeastern Lake Michigan at four locations ranging in depth from 2 to 40 ft and at a distance of 300 to 3375 ft from shore has produced the conclusion that natural lake-water temperature fluctuations greater than 3 F are a common event, except during the month of January. The greatest and most frequent daily temperature fluctuations occurred during the months of June through September, with the observed maximum daily range of 27 F occurring on 20 July 1970. Direct wind-induced upweling of cold deep offshore waters is probably responsible for the natural daily fluctuations in excdess of 12 F, while daily temperature fluctuations less than 12 F are probably the result of a combination of factors. The range between the maximum and minimum recorded monthly temperatures was substantial. However, the average maximum and minimum average temperatures at different depths did not fluctuate greatly from year to year. The deeper stations consistently showed higher maximum andminimum average temperatures for the months of January through March. The shallower stations consistently showed higher maximum and minimum monthly average temperatures during the months of June through September. The similarity between the monthly average maximum and minimum lake-water temperatures at stations of different depths was interpreted as the result of frequent mixing of the waters in this portion of southeastern Lake Michigan. The data indicated that the natural lake-water temperatures vary over a large range on both a daily and monthly basis. Because the existing aquatic community maintains itself within this naturally wide temperature range, it's questionable whether or not the introduction of thermal effluents will markedly influence the aquatic system in this part of Lake Michigan. (Henley-ISWS)
W78-05391

SEASONAL COLOR-INFRARED PHOTOGRAPHS FOR MAPPING INLAND WETLANDS ON U.S. GEOLOGICAL SURVEY 7.5-MINUTE QUADRANGLES,
Geological Survey, Reston, VA. Water Resources Div.; and Geological Survey, Reston, VA. Topographic Div.
For primary bibliographic entry see Field 7B.
W78-05424

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70--PART 16. HAWAII AND OTHER PACIFIC AREAS.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05431

BACTERIAL ANALYSIS IN THE WATER OF THE POOLS OF MOULIN-DE-VERT, VERBOIS-GENEVA, (IN FRENCH),
Geneva Univ. (Switzerland). General Microbiology Lab.
For primary bibliographic entry see Field 5A.
W78-05482

EVALUATION OF DATA FOR PONDS, LAKES AND RESERVOIRS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 5A.
W78-05483

A MATHEMATICAL MODEL OF ECOLOGICAL DISTURBANCES IN A WATER BASIN ORIGINATING UNDER THE INFLUENCE OF A SHORE POLLUTION SOURCE, (IN RUSSIAN),
Institute of Biology of the Southern Seas, Sevastopol (USSR).
For primary bibliographic entry see Field 5B.
W78-05495

THE PRIMARY PRODUCTIVITY OF SUBMERGED MACROPHYTES IN WEST BLUE LAKE, MANITOBA,
Manitoba Univ., Winnepeg. Dept. of Botany.
R. J. R. Love, and G. G. C. Robinson.
Canadian Journal of Botany, Vol. 55, No. 2, p 118-127, 1977. 5 fig, 4 tab, 31 ref.

Descriptors: *Aquatic productivity, *Rooted aquatic plants, *Biomass, *Carbon radioisotopes, *Sampling, Productivity, Primary productivity, Plant growth, Submerged plants, Wetlands, Energy transfer, Littoral, Carbon dioxide, Depth, Aquatic environment, Energy gradient, Phytoplankton, Seasonal reliability, Pondweeds, Stratification, *Canada, *West Blue Lake, Manitoba(Canada), Radioactive carbon dioxide.

Submerged species of macrophytes, taken from the lake's littoral zone, were measured for seasonal productivity and the relative value of this energy input to the ecosystem. Measurements of changes in biomass and the assimilation of radioactive carbon dioxide in random and non-random samples throughout the 1973 growing season were used. Changes in biomass of Potamogeton Richardsonii, Myriophyllum alterniflorum, Megalodonta Beckii, and Chara vulgaris determined from random samples compared favorably with those determined from non-random samples. Potamogeton pectinatus, because of limited occurrence, did not give the same results. Similarly, measurements of radioactive CO2 assimilation in random samples of P. Richardsonii, M. alterniflorum, and M. Beckii compared well with non-random samples. Productivity values derived from radioactive CO2 uptake were far in excess of those attained from biomass changes. Seasonal trends of production and the dpeth distribution on production are discussed, and macrophyte production compared to phytoplankton production. (Steiner-Mass)
W78-05513

A MULTIVARIATE ANALYSIS OF THE NICHES OF PLANT POPULATIONS IN RAISED BOGS. I. NICHE DIMENSIONS,
New Hampshire Univ., Durham. Dept. of Botany.
E. A. Johnson.
Canadian Journal of Botany, Vol 55 (9), p 1201-1210, 1977. 2 fig, 3 tab.

Descriptors: *Bogs, *Niches, *Plant populations, *Evaluation, *Ecological distribution, *Wetlands, Biological communities, Habitats, Nutrient requirements, Surface-groundwater relationships, Surface waters, Water quality, Maine, Peat, Analysis, Analytical techniques, Aquatic habitats, *Niche dimensions, Raised bogs, Multivariate analysis.

Principal component analysis is used as an empirical procedure for defining ecological niches in plant populations in raised bogs. The two niche dimensions identified within the raised bogs are related to mineral-ion concentration: (1) atmospheric input differences owing to proximity to the ocean and (2) mineral-soil groundwater influence. Both of these niche dimensions are related to the two important gradients in the surface water quality of the state of Maine. By comparing the principle component analysis study of the vegetation with the principal component analysis study of the physical environment (peat) using transformation analysis, their very similar but non-linear relationship is demonstrated. (Steiner-Mass)
W78-05517

DISTRIBUTION OF LEAD IN SPHAGNUM FUSCUM PROFILES IN FINLAND,
Helsinki Univ. (Finland). Dept. of Botany.
For primary bibliographic entry see Field 5B.
W78-05521

WINTER STANDING CROP AND NUTRIENT CONTENTS IN FIVE CENTRAL NEW YORK WETLANDS,
Ithaca Coll., Dept. of Biology.
J. M. Bernard, and F. A. Bernard.
Bulletin of the Torrey Botanical Club, Vol. 104, No. 1, p 57-59, January-March, 1977. 3 tab, 10 ref.

Descriptors: *Wetlands, *Cattails, *New York, Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, *Standing crops, *Overwintering biomass, *Nutrient content, *Sedges, Carex sp., Bur reed.

Five wetlands, each dominated by a different species, were sampled prior to April 1 using one ladder quadrat of five 25x25 cm or 50x50 cm plots depending on species. Samples were dug to a depth of 30 cm. All species had large overwintering standing crops ranging from 610 g/sq m for Carex lacustris to 1158 g/sq m for Typha glauca. C. lacustris and C. rostrata were characterized by a relatively large above-ground biomass; the others, C. lanuginosa, Sparganium curycarpum, and T. glauca had small aboveground, but massive belowground standing crops. Total nutrient content showed a similar trend. In almost every case, aboveground tissues had higher percentage nutrient concentrations than belowground tissues. (Stihler-Mass)
W78-05522

TRANSPLANTATION OF TYPA AND THE DISTRIBUTION OF VEGETATION AND ALGAE IN A RECLAIMED ESTUARINE MARSH,
Boyce Thompson Inst. for Plant Research, Yonkers, NY.
S. S. Ristich, S. W. Fredrick, and E. H. Buckley.
Bulletin of the Torrey Botanical Club, Vol. 103, No. 4, p 157-164, July-August, 1976. 2 fig, 4 tab, 10 ref.

Descriptors: *Vegetation establishment, *Tidal marshes, *Cattails, Algae, Aquatic plants, *New York, *Reclaimed estuarine marsh, Clone survival, Estuarine environment, Distribution.

Narrow-leaved cattail clones were transplanted into a reclaimed marsh at Camp Smith, Peekskill, New York, with best clone survival occurring in those transplanted between May and June. The clones produced vigorous shoots that fruited the third growing season. During the first and second years, 40 species of vascular plants invaded the reclaimed area via floating seeds and plant fragments or from buried seeds. Floral species were similar to those of the adjacent marsh. Algae of 63 genera invaded the area, and overall generic composition was similar to that of the main channel of the tidal stream bisecting the marsh. (Stihler-Mass)
W78-05526

LIMITATIONS ON MACROPHYTES IN A EUTROPHIC LAKE, LOCH LEVEN. II. WAVE ACTION, SEDIMENTS AND WATERFOWL GRAZING,
Saint Andrews Univ. (Scotland). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W78-05527

THE STRATIGRAPHY AND GEOMORPHOLOGY OF THE HOFMANN FOREST POCOSIN,
Soil Conservation Service, Raleigh, NC. and North Carolina State Univ. at Raleigh. Dept. of Soil Science.
R. B. Daniels, E. E. Gamble, W. H. Wheeler, and C. S. Holzhey.
Soil Science Society of America Journal, Vol 41, No 6, p 1175-1180, November-December 1977. 4 fig, 5 tab, 33 ref.

Descriptors: *Swamps, *Forests, *Organic matter, *North Carolina, *Geomorphology, *Stratigraphy, Soils, Drainage, Stream, Overland flow, Precipitation(Atmospheric), Rainfall, Evapotranspiration, Aquicludes, Soil water, Groundwater, Water table, Hydrology, *Pocosins, Pocosin hydrology, Organic soils, Organic accumulation.

Hofmann Forest is a 34,000 ha pocosin (swamp-on-a-hill) that has about 25,000 ha of Histosols 0.4 to 2-m thick. The pocosin is about 17 m above sea level, and large organic areas are uncommon at these at altitudes in North Carolina. A stratigraphic and geomorphic study of Hofmann Forest was made to determine what factors were responsible for the accumulation of organic materials. The organic materials of the pocosin mantle a gentle undulating marine plain that was exposed to subaerial weathering about 220,000 years ago. Few streams drain the area, and the organic materials occupy the undissected interstream divides where the distance between streams is from approximately 0.5 to 8 km. Flux rates indicate that the very low hydraulic conductivity of the pre-Croatan formations and their closeness to the surface prevent significant removal of excess water through the permeable thin surficial beds to the adjacent streams. Rainfall exceeds evaportranspiration, and the excess must be removed primarily by overland flow to the streams. The shallow depth to the pre-Croatan aquicludes, the large distane between streams, and an excess of rainfall over evapotranspiration are the three major reasons why organic materials mantle a gently undulating plain about 17 m above sea level. The first two have remained nearly unchanged over the major part of the Hofmann Forest organic areas for the last 220,000 years. These conditions make the pocosin a potential area for organic accumulation. It is possible that organic deposits have been discontinuous during the last 220,000 years because of wide flucuations in temperature and, presumably, in rainfall. (Sims-ISWS)
W78-05577

2I. Water In Plants

DIFFUSION RESISTANCE AND XYLEM POTENTIAL IN STRESSED AND UNSTRESSED NORTHERN HARDWOOD TREES,
Northeastern Forest Experiment Station, Durham, NH.
C. A. Federer, and G. W. Gee.
Ecology 57, p 975-984, 1976. 6 fig, 3 tab, 33 ref.

Descriptors: *Moisture stress, *Stomata, Deciduous trees, Leaves, Physiological ecology, Soil-water-plant relationships, Leaf conductance, Leaf resistance, Plant-water potential, New Hampshire.

In a northern hardwood forest in central New Hampshire, daytime diffusion resistances of abaxial leaf surfaces were independent of light level above 250 microeinsteins/(sq m s), increased as vapor pressure deficit increased, and decreased as temperature increased. High vapor pressure deficit at midday caused slight stomatal closure, which appeared to be indipendent of leaf H20 potential. Low plant H20 potential may have produced additional closure at high atmospheric demand even though soil-water potential was > -0.2 bar. At an atmospheric demand of 250 W per sq m xylem potential averaged -16 bar for Betula alleghaniensis, -21 bar for Acer saccharum, and -23 bar for Fagus grandifolia, and decreased only sightly as demand increased further. Daytime diffusion resistance averaged 2.5 s/cm for B. alleghaniensis, 3.1 s/cm for A. saccharum, and 3.3 s/cm for F. grandifolia when light was adequate. The resistance difference implies the possibility of higher transpiration rates in B. alleghaniensis. Several trees were artificially stressed by trenching around them and covering the soil block with polyethylene. After 2-3 wk with rain excluded, soil-water potential ranged from -0.4 to -0.8 bar, and daytime diffusion resistance averaged 5 s/cm, indicating significant stomatal closure caused by H20 stress. However daytime xylem potentials on stressed trees were the same as or higher than those on unstressed trees. Stomatal control effectively prevented excessive H20 loss and prevented xylem potential from declining below its normal operating levels. (Forest Service)
W78-05246

DIFFERING DIFFUSIVE RESISTANCE AND LEAF DEVELOPMENT MAY CAUSE DIFFERING TRANSPIRATION AMONG HARDWOODS IN SPRING,
Northeastern Forest Experiment Station, Durham, NH.
For primary bibliographic entry see Field 2D.
W78-05247

NUTRIENTS: A MAJOR CONSIDERATION IN INTENSIVE FOREST MANAGEMENT,
Northeastern Forest Experiment Station, Durham, NH.
For primary bibliographic entry see Field 4A.
W78-05250

MACROPHYTE-EPIPHYTE BIOMASS AND PRODUCTIVITY IN AN EELGRASS (ZOSTERA MARINA L.) COMMUNITY,
North Carolina State Univ. at Raleigh.
For primary bibliographic entry see Field 2L.
W78-05512

THE PRIMARY PRODUCTIVITY OF SUBMERGED MACROPHYTES IN WEST BLUE LAKE, MANITOBA,
Manitoba Univ., Winnepeg. Dept. of Botany.
For primary bibliographic entry see Field 2H.
W78-05513

EARLY PLANT SUCCESSION ON A DREDGING SPOILS ISLAND IN THE SENECA RIVER OF UPSTATE NEW YORK,
Eisenhower Coll., Seneca Falls, NY. Div. of Science and Mathematics.
For primary bibliographic entry see Field 5G.
W78-05523

VEGETATION GRADIENTS IN THE STREAMSIDE FOREST OF HICKORY CREEK, WILL COUNTY, ILLINOIS,
Illinois Univ. at Urbana-Champaign. Dept. of Forestry.
D. T. Bell, and R. Moral.
Bulletin of the Torrey Botanical Club, Vol. 194, No. 2, p 127-135, April-June, 1977. 2 fig, 3 tab, 25 ref.

Descriptors: *Flood plains, *Deciduous trees, Succession, Wetlands, *Illinois, Streams, Flood frequency, Maple trees, Ash trees, *Vegetation gradients, *Streamside forests, Green ash, Sugar maple, Crataegus mollis, Species diversity, American basswood, Species richness, Flood stress, *Hickory Creek(Ill).

Mature upland forests are dominated by sugar maple with American basswood being the most common associate. Mature flood plain regions harbor a green ash-American basswood dominated complex. The first forest stage in both regions is dominated by Crataegus mollis. Stand structure was also influenced by the response of species to an elevational gradient associated with flood frequency. Spécies richness and species diversity tended to increase with increasing maturity and decreasing flood stress. (Steiner-Mass)
W78-05611

2J. Erosion and Sedimentation

PRESERVING THE ENVIRONMENT OF A SANDHILLS REGION CONCURRENT WITH INTENSIVE IRRIGATION DEVELOPMENT,
Nebraska Univ., Lincoln. Water Resources Center.
For primary bibliographic entry see Field 3F.
W78-05348

WATER-HOLDING CAPACITY FOR HYDROMULCH,
California State Dept. of Transportation, Sacramento. Transportation Lab.
For primary bibliographic entry see Field 4D.
W78-05363

SEDIMENTATION OF DISPERSED OIL IN SURFACE WATERS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. of Aquatic Sciences.
For primary bibliographic entry see Field 5B.
W78-05373

TRANSVERSE MIXING IN MEANDERING CHANNELS WITH VARYING BOTTOM TOPOGRAPHY,
Canada Centre for Inland Waters, Burlington (Ontario). Hydraulics Research Div.
For primary bibliographic entry see Field 5B.
W78-05390

AUTOMATED ATOMIC ABSORPTION SPECTROMETRIC DETERMINATION OF TOTAL ARSENIC IN WATER AND STREAMBED MATERIALS,
Geological Survey, Denver, CO. Water Resources Div.
For primary bibliographic entry see Field 5A.
W78-05421

AN ANALYSIS OF SALINITY IN STREAMS OF THE GREEN RIVER BASIN, WYOMING,
Geological Survey, Cheyenne, WY. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-05439

TRANSVERSE BED SLOPES IN CURVED ALLUVIAL STREAMS,
Karlsruhe Univ. (West Germany). Inst. fuer Hydromechanik.
For primary bibliographic entry see Field 8B.
W78-05567

TEMPERATURE AND MISSOURI RIVER STAGES NEAR OMAHA,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-05569

HIGHWAYS IN THE RIVER ENVIRONMENT--HYDRAULIC AND ENVIRONMENTAL DESIGN CONSIDERATIONS, BASIC COURSE, INSTRUCTOR'S LESSON PLANS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-05585

MATHEMATICAL MODELING OF SHORELINE EVOLUTION,
Tetra Tech, Inc., Pasadena, CA.
For primary bibliographic entry see Field 2L.
W78-05626

OFFSHORE PERMAFROST STUDIES, BEAUFORT SEA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05635

AREAS OF FAULTING AND POTENTIALLY UNSTABLE SEDIMENTS IN THE ST. GEORGE BASIN REGION, SOUTHERN BERING SEA,
Geological Survey, Menlo Park, CA.
J. V. Gardner, and T. L. Vallier.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 17. Hazards, p 230-241, March 1977. 6 fig, 3 tab, 7 ref.

Descriptors: *Sediments, *Faults(Geologic), *Hazards, *Soil mechanics, Baseline studies, Resources development, Alaska, *Outer Continental Shelf, Bering Sea, Petroleum development, Offshore operations.

Preliminary analyses of seismic and sediment data collected during the 1976 field year in the St. George Basin region of the southern Bering Sea continental margin, indicate that the large submarine canyons in the region, the Pribilof and Bering Canyons, exert a profound influence on the sediment distribution and dynamics of the adjacent outer continental shelf region including St. George and Amak Basins. In addition data show that the upper continental slope and shelf break are areas of mass movement of sediment (creeping, slumping, and catastrophic movement as shown by steep scarps). The effects of the canyons on the distribution of sediment and the near-bottom dynamics must be known before man-made structures, whether they be offshore rigs, underwater completion systems, storage facilities, or pipelines, are placed in this area. An investigation of slumping along the continental margin should allow an estimate of the present rate of sediment flux over the outer continental shelf region and what it has been in the past. This study focuses on faulting and potential sediment instability by describing the types and distribution of faults and by outlining areas where potentially unstable sediment masses occur. (See also W78-05222) (Sinha-OEIS)
W78-05637

FAULTING, INSTABILITY, EROSION, AND DEPOSITION OF SHELF SEDIMENTS, EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05639

BENTHOS-SEDIMENTARY SUBSTRATE INTERACTIONS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W78-05643

SHALLOW FAULTING, BOTTOM INSTABILITY, AND MOVEMENT OF SEDIMENTS IN LOWER COOK INLET AND WESTERN GULF OF ALASKA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05644

FAULTING, SEDIMENT INSTABILITY, EROSION, AND DEPOSITION HAZARDS OF THE NORTON BASIN SEAFLOOR,
Geological Survey. Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05646

SEDIMENT TRANSPORT IN NORTON SOUND - NORTHERN BERING SEA, ALASKA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05647

COASTAL PROCESSES AND MORPHOLOGY OF THE BERING SEA COAST OF ALASKA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05648

2K. Chemical Processes

STUDY ON THE STATE OF WATER IN DISPERSIONS OF H+, MG2+ AND FE3+ MONTMORILLONITES BY HIGH-RESOLUTION NMR, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics; and Moscow State Univ. (USSR). Dept. of Soil Melioration.
V. F. Babanin, A. D. Voronin, and Yu. E. Malinovskii.
Vestn Mosk Univ Ser Vi Biol Pochvoved 31(4), p 94-98, 1976.

Descriptors: Cations, *Hydrogen ions, *Iron ions, *Magnesium ions, Minerals, Montmorillonites, Surface waters, *Ion transport, Neutron magnetic resonance.

Two forms of water were discovered that are distinguished by the degree of mobility in the force field of the mineral surface. The type of cation has an influence on the size of the boundary zones.--Copyright 1977, Biological Abstracts, Inc.
W78-05238

SEASONAL PATTERNS IN ACIDITY OF PRECIPITATION AND THEIR IMPLICATIONS FOR FOREST STREAM ECOSYSTEMS,
Northeastern Forest Experiment Station, Durham, NH.
J. W. Hornbeck, G. E. Likens, and J. S. Eaton.
In: L. S. Dochinger and T. A. Seliga (editors), Proceedings of First International Symposium on Acid Precipitation and the Forest Ecosystem. USDA Forest Service General Technical Report NE-23, p. 597-603, 1976, 5 fig, 1 tab, 13 ref.

Descriptors: *Chemistry of precipitation, *Forests, *Acidity, Snowpack, Streamflow, Ion exchange, *Seasonal patterns, New Hampshire, Hubbard Brook Experimental Forest(NH), H ion exchange, *Precipitation acidity, Throughfall chemistry.

Data collected since 1965 at a network of nine stations in the northeastern United States show that precipitation is most acid in the growing season (May-September) and least acid in winter (December-February). For the Hubbard Brook station in New Hampshire, where the mean hydrogen ion content of precipitation ranges between 46 micro eq/l in winter and 102 micro eq/l in summer, the seasonal pattern in acidity correlates closely with seasonal differences in S deposition from the atmosphere. As summer precipitation passes through the forest canopy, H ion concentrations are lowered by an average of 90%, primarily as a result of exchange with other cations. In winter the H ion content of incident precipitation is lowered from a mean of 50 micro eq/l to a mean of 25 micro eq/l during storage in the snowpack. (Forest Service)
W78-05244

NUTRIENTS: A MAJOR CONSIDERATION IN INTENSIVE FOREST MANAGEMENT,
Northeastern Forest Experiment Station, Durham, NH.
For primary bibliographic entry see Field 4A.
W78-05250

ANNUAL REPORT ON THE DEVELOPMENT OF SENSORS AND TECHNIQUES FOR IN SITU WATER QUALITY MONITORING,
Pittsburgh Univ., PA. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 5A.
W78-05362

MICROPROBE ANALYSIS OF PROJECT DUSTORM HAILSTONE SAMPLES,
National Center for Atmospheric Research, Boulder, CO.
S. N. Gitlin.
Journal of Applied Meteorology, Vol 17, No 1, p 64-72, January 1978. 10 fig, 4 tab, 3 ref.

Descriptors: *Hail, *Soils, *Dust storms, X-ray analysis, Wind erosion, Chemical analysis, Chemicals, Aluminum, Potassium, Calcium, Sodium, Chlorine, Silica, Cloud physics, Meteorology, Hailstones.

Electron microprobe X-ray analysis was used to determine the origin and composition of particulate matter found in hailstones produced during severe storms in the midwestern and central United States. Ratios of aluminum, potassium, calcium, sodium, and chlorine X-ray counts to silicon counts were measured for soil samples collected on the ground and compared with ratios for aerosols collected by aircraft and for the particles found in hailstones. Hailstones had higher ratios of K/Si and Ca/Si and lower ratios of Al/Si than the ratios found in soils. Chlorine (absent in dry soil particles) and sodium were found in the hailstones, suggesting that these elements may belong to a compound that is marine in origin. (Sims-ISWS)
W78-05381

AUTOMATED ATOMIC ABSORPTION SPECTROMETRIC DETERMINATION OF TOTAL ARSENIC IN WATER AND STREAMBED MATERIALS,
Geological Survey, Denver, CO. Water Resources Div.
For primary bibliographic entry see Field 5A.
W78-05421

AN ANALYSIS OF SALINITY IN STREAMS OF THE GREEN RIVER BASIN, WYOMING,
Geological Survey, Cheyenne, WY. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-05439

GROUND WATER IN THE KOEHN LAKE AREA, KERN COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-05442

DEVELOPMENT OF A SYSTEM FOR CONDUCTING INTERLABORATORY TESTS FOR WATER QUALITY AND EFFLUENT MEASUREMENTS,
FMC Corp., San Jose, CA. Advanced Products Div.
For primary bibliographic entry see Field 5A.
W78-05534

RELIABLE ANALYSES OF WATER BY INDUCTIVELY COUPLED PLASMA EMISSION SPECTROSCOPY,
Environmental Research Lab., Athens, GA.
For primary bibliographic entry see Field 5A.
W78-05542

THE INFLUENCE OF CATION EXCHANGE AND GYPSUM SOLUBILITY ON THE TRANSPORT OF SODIUM, CALCIUM AND SULPHATE THROUGH SOILS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
For primary bibliographic entry see Field 2G.
W78-05576

2L. Estuaries

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 1. RECEPTORS--MAMMALS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05206

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME II. RECEPTORS--BIRDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05207

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME III. RECEPTORS--BIRDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05208

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME IV. RECEPTORS--BIRDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05209

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME V. RECEPTORS--BIRDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05210

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME VI. RECEPTORS--FISH, LITTORAL, BENTHOS,
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05211

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME VII. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05212

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME VIII. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05213

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME IX. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05214

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME X. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05215

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XI. RECEPTORS--MICROBIOLOGY.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05216

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XII. EFFECTS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05217

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF VOLUME XIII. CONTAMINANT BASELINES.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05218

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XIV. TRANSPORT.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05219

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XV. TRANSPORT.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05220

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XVI. HAZARDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05221

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XVII. HAZARDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05222

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XVIII. HAZARDS, DATA MANAGEMENT.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05223

PROCESSES OF CARBON DIOXIDE FLUX IN THE FANNING ISLAND LAGOON,
Hawaii Inst. of Marine Biology, Honolulu.
For primary bibliographic entry see Field 5B.
W78-05229

ELECTROMAGNETIC WATER CURRENT METER WITH SYNTHETIC DIRECTION FIELD,
For primary bibliographic entry see Field 7B.
W78-05234

PROCEEDINGS OF THE CONFERENCE ON ASSESSING THE EFFECTS OF POWER-PLANT-INDUCED MORTALITY ON FISH POPULATIONS.
Energy Research and Development Administration, Oak Ridge, TN.; and Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 5C.
W78-05251

SOME FACTORS REGULATING THE STRIPED BASS POPULATION IN THE SACRAMENTO-SAN JOAQUIN ESTUARY, CALIFORNIA,
California State Dept. of Fish and Game, Stockton.
For primary bibliographic entry see Field 5C.
W78-05253

ESTIMATING THE SIZE OF JUVENILE FISH POPULATIONS IN SOUTHEASTERN COASTAL-PLAIN ESTUARIES,
National Marine Fisheries Service, Beaufort, NC. Beaufort Lab.
For primary bibliographic entry see Field 5C.
W78-05256

STRIPED BASS (MORONE SAXATILIS) MONITORING TECHNIQUES IN THE SACRAMENTO-SAN JOAQUIN ESTUARY,
California State Dept. of Fish and Game, Stockton.
For primary bibliographic entry see Field 5C.
W78-05257

BIOLOGICAL ASSESSMENT OF THE SOLUBLE FRACTION OF THE STANDARD ELUTRIATE TEST,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W78-05366

SEDIMENT STUDIES IN BACK RIVER ESTUARY, BALTIMORE, MARYLAND.
National Enforcement Investigations Center, Denver, CO.
For primary bibliographic entry see Field 5B.
W78-05369

THE APPLICATION OF A TWO-LAYER TIME-DEPENDENT MODEL TO POLLUTION ASSESSMENT AND CONTROL IN A SHORT STRATIFIED ESTUARY,
Sydney Univ. (Australia). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W78-05375

PRELIMINARY DESIGN OF OCEAN OUTFALL AT SYDNEY: PROTECTION OF BATHING WATERS,
Caldwell Connell Engineers, Melbourne (Australia).
For primary bibliographic entry see Field 5B.
W78-05377

STATE GUIDELINES FOR LOCAL PLANNING IN THE COASTAL AREA UNDER THE COASTAL AREA MANAGEMENT ACT OF 1974.
North Carolina Coastal Resources Commission, Raleigh.
For primary bibliographic entry see Field 6E.
W78-05399

POTENTIAL FOR LAND SUBSIDENCE DUE TO REDUCTION OF ARTESIAN HEAD IN THE ATLANTIC COASTAL PLAIN,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2F.
W78-05422

A MATHEMATICAL MODEL OF ECOLOGICAL DISTURBANCES IN A WATER BASIN ORIGINATING UNDER THE INFLUENCE OF A SHORE POLLUTION SOURCE, (IN RUSSIAN),
Institute of Biology of the Southern Seas, Sevastopol (USSR).
For primary bibliographic entry see Field 5B.
W78-05495

ANALYSIS OF ORGANIC MATTERS IN KRAFT PULP MILL EFFLUENT IN HIRO BAY (HIROWAN KURAFUTO PARUPU KOJO HAISUIKO FUKIN NO YUKIBUTSU NO BUNSEKI),
Government Industrial Research Inst., Hirohata (Japan).
For primary bibliographic entry see Field 5A.
W78-05502

PHYTOPLANKTON IN A TEMPERATE-ZONE SALT MARSH: NET PRODUCTION AND EXCHANGES WITH COASTAL WATERS,
State Univ. of New York at Stony Brook. Dept. of Ecology and Evolution.
For primary bibliographic entry see Field 5C.
W78-05511

MACROPHYTE-EPIPHYTE BIOMASS AND PRODUCTIVITY IN AN EELGRASS (ZOSTERA MARINA L.) COMMUNITY,
North Carolina State Univ. at Raleigh.
P. A. Penhale.
Journal of Experimental Marine Biology and Ecology, Vol. 26, p 211-224, 1977. 7 fig, 1 tab, 28 ref.

Descriptors: *Rooted aquatic plants, *Environmental effects, *Biomass, *Productivity, *Estuaries, Epiphytology, Aquatic plants, Aquatic algae, Marine plants, Light intensity, Water temperature, Wetlands, Aquatic habitats, Seasonal, Tides, Photosynthesis, North Carolina, *Eelgrass, *Epiphytes, Macrophytes.

The biomass, productivity, and photosynthetic response to light and temperature of eelgrass, Zostera marina, and its epiphytes was measured in a shallow estuarine system. The maximum of the above-ground biomass was measured in Marsh; this was followed by a general decline throughout the rest of the year. Eelgrass and epiphyte productivity was low during the spring and early summer, gave a maximum during later summer and fall, and declined during the winter; this progression was probably due to environmental factors associated with tidal heights. On an areal basis, the average annual productivity was 0.9 g carbon/sq m/day for eelgrass and 0.2 g carbon/sq m/day for the epiphytes. Rates of photosynthesis of both eelgrass and epiphytes increased with increasing temperature to an asymptotic value at which the systm was light saturated. Both eelgrass and epiphytes had a temperature optimum of 29 degrees C. A negative response to higher temperatures was also reflected in biomass measurements which showed the destruction of eelgrass with increasing summer temperatures. The data suggest that the primary productivity cycles of macrophytes and epiphytes are closely interrelated. (Steiner-Mass)
W78-05512

FLAX POND ECOSYSTEM STUDY: EXCHANGES OF PHOSPHORUS BETWEEN A SALT MARSH AND THE COASTAL WATERS OF LONG ISLAND SOUND,
Marine Biological Lab., Woods Hole, MA.
For primary bibliographic entry see Field 5C.
W78-05514

HETEROTROPHIC ACTIVITY ASSOCIATED WITH PARTICULATE SIZE FRACTIONS IN A SPARTINA ALTERNIFLORA SALT-MARSH ESTUARY, SAPELO ISLAND, GEORGIA, USA, AND THE CONTINENTAL SHELF WATERS,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 5C.
W78-05515

INCREASE IN ABUNDANCE OF SOLIDAGO SEMPERVIRENS ON A DIKED SALT MARSH IN SOUTHWESTERN CONNECTICUT,
Fairfield Univ., CT. Dept. of Biology.
For primary bibliographic entry see Field 2G.
W78-05518

EFFECTS OF SALINITY AND INUNDATION ON THE GROWTH OF AGROSTIS STOLONIFERA AND JUNCUS GERARDII,
Vrije Univ., Amsterdam (Netherlands). Biological Lab.
For primary bibliographic entry see Field 5C.
W78-05519

RESPONSE OF WEST COAST BEACH TAXA TO SALT SPRAY, SEAWATER INUNDATION, AND SOIL SALINITY,
California Univ., Davis. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W78-05520

AQUATIC METABOLISM OF THE COMMUNITIES ASSOCIATED WITH ATTACHED DEAD SHOOTS OF SALT MARSH PLANTS,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 5C.
W78-05524

OBSERVATIONS ON ICE DEPOSITED BY WAVES ON ALASKAN ARCTIC BEACHES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 2C.
W78-05595

MANAGEMENT: SOUTHEAST CONTINENTAL SHELF STUDIES,
Skidaway Inst. of Oceanography, Savannah, GA.
For primary bibliographic entry see Field 6E.

W78-05625

MATHEMATICAL MODELING OF SHORELINE EVOLUTION,
Tetra Tech, Inc., Pasadena, CA.
B. Le Mehaute, and M. Soldate.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-047 641, Price codes: A04 in paper copy, A01 in microfiche. Army Corps of Engineers, Coastal Engineering Research Center Miscellaneous Report No 77-10, October 1977. 56 p, 21 fig, 2 tab, 33 ref. DACW72-7T-C-0002.

Descriptors: *Mathematical models, *Resources development, *Coastal engineering, Shores, Slope stability, Beach erosion, Environmental effects, *Outer Continental Shelf, Shorelines.

A critical literature survey on mathematical modeling of shoreline evolution is presented. The emphasis is on long-term evolution rather than seasonal or evolution taking place during a storm. The one-line theory of Pelnard-Considere (1956) is developed along with a number of applications. Refinements to the theory are introduced by considering changes of beach slope, wave diffraction effects, wave variation, and variation of sea level. The case of hooked bays is also reviewed. It is concluded that a finite-difference mathematical scheme could be developed for engineering purposes for a small wave angle. For the large wave angle, shoreline instability does not permit use of a reliable mathematical model at this time. (Sinha-OEIS)
W78-05626

TRANSPORT AND TRANSFER RATES IN THE WATERS OF THE CONTINENTAL SHELF,
Lamont-Doherty Geological Observatory, Palisades, NY.
For primary bibliographic entry see Field 5B.
W78-05627

COASTAL MORPHOLOGY, SEDIMENTATION AND OIL SPILL VULNERABILITY,
South Carolina Univ., Columbia. Div. of Coastal Research.
For primary bibliographic entry see Field 5G.
W78-05628

THE ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY OF THE GULF OF ALASKA COASTAL PLAIN AND THE COASTAL ZONE OF KOTZEBUE SOUND,
Alaska Univ., College. Dept. of Solid Earth Science.
P. J. Cannon.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 16. Hazards, p 333-345, March 1977. 4 fig, 2 ref. 03-5-022-56.

Descriptors: *Geomorphology, *Coasts, *Baseline studies, *Cold regions, Climatology, Resources development, Water pollution, Hazards, *Outer Continental Shelf, Gulf of Alaska, Kotzebue Sound, Petroleum development, Offshore operations.

Due to the retarding effect of the Arctic climate some geomorphic features (such as old shorelines and deltas) have been uniquely preserved. The delineation of past shorelines and deltas will perhaps indicate potential archaeological sites. The coastal zone exhibits a large range of geomorphic features and within the coastal zone the interaction of major geomorphic processes is complex. Due to this complexity, consideration of environmental problems and potential developments within the coastal zone will have to be done on a location by location basis. Environmental assessments must be made by geomorphic divisions with special attention being given to specific features within the divisions. (See also W78-05221) (Sinha-OEIS)
W78-05632

THE ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY OF THE GULF OF ALASKA COASTAL PLAIN,
Alaska Univ., College. Div. of Geoscience.
P. J. Cannon.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 16. Hazards, p 346-384, March 1977. 9 fig, 5 tab, 7 ref, 5 maps.

Descriptors: *Geomorphology, *Hazards, *Baseline studies, Resources development, *Outer Continental Shelf, *Radar imagery, *Geologic hazards, Gulf of Alaska, Petroleum development, Offshore operations.

Information which can be used in an environmental assessment of the coastal plain of the Gulf of Alaska is presented as well as an evaluation of radar imagery as a major information source for environmental geological mapping. The radar imagery of the Gulf of Alaska coastal plain indicates that severe environmental geologic hazards, such as earthquakes, surface movements along active faults, and outburst floods, have occurred recently and will continue to occur with a relatively high frequency. Natural processes are modifying parts of the coastal plain at a relatively rapid rate. These processes include the formation of large lakes by glacial ablation and the erosion of headlands due to changes in the sediment supply from glaciers. It is necessary to emphasize that the changes are natural and not the result of man's activities. In an area like the Gulf of Alaska, radar imagery is the only tool which can be used to adequately monitor the results of natural processes. (See also W78-05221) (Sinha-OEIS)
W78-05633

DELINEATION AND ENGINEERING CHARACTERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA,
Cold Regions Research and Engineering Lab., Hanover, NH.
For primary bibliographic entry see Field 2C.
W78-05634

OFFSHORE PERMAFROST STUDIES, BEAUFORT SEA,
Geological Survey, Menlo Park, CA.
D. M. Hopkins.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 16. Hazards, p 396-518, March 1977.

Descriptors: *Permafrost, *Sediments, *Geologic history, *Cold regions, Baseline studies, Hazards, Ice, Alaska, *Outer Continental Shelf, *Subsea permafrost, Geologic hazards, Petroleum development, Offshore operations, Beaufort Sea, Prudhoe Bay.

This study is designed to obtain direct knowledge of offshore permafrost, based on thermally instrumented boreholes in the Prudhoe Bay area. Three boreholes were drilled during spring 1976, and additional boreholes will be placed during spring 1977. The 1976 boreholes, combined with boreholes placed by the Univ. of Alaska in 1975 and a single borehole placed on Reindeer Island by Humble Oil Company some years earlier, show that the subsea sediments are below 0C throughout the Beaufort Sea shelf at least as far as 13 km offshore and suggest that sub-zero temperatures are found to the edge of the shelf. In shallow water areas where winter ice rests on the bottom, the subsea sediments are ice-bonded beginning at a depth of a few meters and extending to depths of several hundred meters. Further offshore, the subsea sediments are soaked with liquid brine to depths of 50 m or more, but relict ice-bonded permafrost is commonly present at greater depths on those parts of the shelf that lie landward of the 20-m isobath. The report presents detailed data on paleomagnetic character and fossil content of the sediments and an extensive discussion of the thermal data. (See also W78-05221) (Sinha-OEIS)
W78-05635

MARINE ENVIRONMENTAL PROBLEMS IN THE ICE COVERED BEAUFORT SEA SHELF AND COASTAL REGIONS,
Geological Survey, Menlo Park, CA.
P. Barnes, E. Reimnitz, and D. Drake.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 17. Hazards, p 1-229, March 1977.

Descriptors: *Sea ice, *Permafrost, *Hazards, *Geomorphology, Sediments, Scour, Pipelines, Foundations, Water resources, Environmental effects, Alaska, *Outer Continental Shelf, Engineering properties, Offshore operations, Beaufort Sea.

The character of the Arctic continental shelf and coastal area, with its year round and seasonal sea ice and with its permafrost, faces the developer with many special problems. The interaction of the Arctic shelf with the Arctic pack ice takes the form of ice gouging and the formation of a large stamukhi zone each winter. Oil drilling and production during the next several years will probably not extend into the stamukhi zone seaward of the seasonal fast-ice zone. Of critical concern are the ice gouge and strudel scour effects on structures and pipelines. Any structure which is to be mated with the ocean floor requires data concerning the strength and character of the ocean floor. Furthermore, foundation materials in the form of gravels will be needed for work pads offshore. In addition, the offshore drilling operation may encounter permafrost which could be substantially altered during the process of pumping hot oil up to the sea floor or along the sea floor in gathering and transportation pipelines. (See also W78-05222) (Sinha-OEIS)
W78-05636

AREAS OF FAULTING AND POTENTIALLY UNSTABLE SEDIMENTS IN THE ST. GEORGE BASIN REGION, SOUTHERN BERING SEA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2J.
W78-05637

EARTHQUAKE ACTIVITY AND GROUND SHAKING IN AND ALONG THE EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, CA. Office of Earthquake Studies.
C. D. Stephens, and J. C. Lahr.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 17. Hazards, p 242-275, March 1977. 12 fig, 18 ref, 4 append.

Descriptors: *Earthquakes, *Baseline studies, *Hazards, Resources development, Alaska, *Outer Continental Shelf, Gulf of Alaska, Epicenters, Petroleum development.

The objective of this research is to evaluate the hazards associated with earthquake activity in the eastern Gulf of Alaska and adjacent onshore areas. These hazards may pose a threat to the safety of petroleum development. Preliminary earthquake epicenters in the eastern Gulf of Alaska region were plotted and a catalog of the events listed. The pattern of seismic activity with close spatial and temporal clustering of earthquakes, appears to be characteristic of the low-magnitude activity in the eastern Gulf of Alaska. In the first quarter of 1976, a number of earthquakes occurred in the Prince William Sound

area southwest of Valdez. These events suggest a linear northwest trend that closely parallels other structures and faults near this area, although there are no mapped or inferred faults clearly associated with the activity. Over the past two years the Icy Bay area has been almost continually active. A well-defined, northeast trend in the epicenters of the earthquakes which have occurred since September of 1974 closely parallels the strike of both an offshore anticline and an inferred onshore thrust. (See also W78-05222) (Sinha-OEIS)
W78-05638

FAULTING, INSTABILITY, EROSION, AND DEPOSITION OF SHELF SEDIMENTS, EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, CA.
P. I. P. R. Carlson, and B. F. Molnia.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 17. Hazards, p 276-317, March 1977. 17 fig, 51 ref.

Descriptors: *Earthquakes, *Hazards, *Baseline studies, Erosion, Sedimentation, Resources development, Alaska, *Outer Continental Shelf, *Gulf of Alaska, Petroleum development.

The northeastern Gulf of Alaska OCS is a region of frequent earthquakes, violent storms, and rapid accumulation of unconsolidated sediment. These phenomena create significant seafloor environmental hazards chief of which are: (1) surface and near-surface faulting, (2) rapid deposition and erosion, and (3) instability of the seafloor. Surface and near-surface faults thus far detected are in four main parts of the OCS area: (1) south of Cape Yakataga, (2) on or adjacent to the Kayak Island platform (3) on Tarr Bank and (4) near Middleton Island. Most of the faults cut Tertiary strata that either crop out at the seafloor or are covered by a thin veneer of Holocene sediment. Very few faults have been found that unequivocally cut Holocene sediments. The areas of most rapid accumulation of Holocene unconsolidated sediments are the nearshore zones seaward of the Copper River and seaward of the Malaspina and Bering Glaciers. (See also W78-05222) (Sinha-OEIS)
W78-05639

SEISMIC AND VOLCANIC RISK STUDIES - WESTERN GULF OF ALASKA,
Alaska Univ., College. Geophysical Inst.
H. Pulpan, and J. Kienle.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 17. Hazards, p 318-423, March 1977. 13 fig, 4 append. 03-5-022-55.

Descriptors: *Volcanoes, *Earthquakes, *Baseline studies, Hazards, Alaska, Resources development, *Outer Continental Shelf, Gulf of Alaska, Petroleum development.

The purpose of this research was to determine the seismicity of the Lower Cook Inlet, Kidiak Island, and Alaska Peninsula areas and the associated seismic risk to onshore and offshore developments. It was also the purpose to monitor the earthquake activity of two recently active volcanoes and evaluate their eruption potential and associated risk. The seismic network layout is given with remarks on their operations and failures due to the weather and poor quality of transmission. The higher density of earthquake hypocenters in the lower Cool Inlet seem to be a reflection of the higher reliability of that network and the higher station density. However until a sufficiently long period of reliable operation has been achieved, no comparison of the seismicity level between the different areas can be made. Augustine Volcano was visited two more times after the emergency field operations in late January and February 1976 following the initial vent clearing eruptions of January 22-25, 1976, and the extrusion of a new lava dome in early February 1976. A narrative of the 1976 eruption is given. (See also S78-05222) (Sinha-OEIS)
W78-05640

OFFSHORE PERMAFROST - DRILLING, BOUNDARY CONDITIONS, PROPERTIES, PROCESSES AND MODELS. DELINEATION OF MOST PROBABLE AREAS FOR SUBSEA PERMAFROST IN THE CHUKCHI SEA FROM EXISTING DATA. SUBSEA PERMAFROST: PROBING, THERMAL REGIME AND DATA ANALYSIS,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-05641

BEAUFORT SEACOAST PERMAFROST STUDIES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-05642

SHALLOW FAULTING, BOTTOM INSTABILITY, AND MOVEMENT OF SEDIMENTS IN LOWER COOK INLET AND WESTERN GULF OF ALASKA,
Geological Survey, Menlo Park, CA.
M. A. Hampton, and A. H. Bouma.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 17. Hazards, p 519-626, March 1977. 2 tab, 8 ref, 5 append.

Descriptors: *Sediments, *Seismology, *Baseline studies, Resources development, Hazards, Alaska, *Outer Continental Shelf, *Submarine slides, *Offshore operations, Gulf of Alaska, Environmental conditions, Petroleum development.

Geological investigations in lower Cook Inlet and the western Gulf of Alaska (Kodiak Shelf) were conducted in 1976 aboard the R/V SEA SOUNDER during a period of 6 weeks. Seismic profiling and sampling of bottom sediments were the prime activities, but also limited side-scan sonar and bottom television observations were made. The prime objectives were the identification of active faults and sediment instability as part of an assessment of environmental geologic hazards, and to obtain information about sediment types and their distribution. Both the influence of seismicity, and the sweeping clean of the bank tops and concentrating finer materials in the troughs, pose certain difficulties in OCS oil and gas development. The relationship between physiography and sediment type shows the influence of the current regime and determines the distribution of benthic biota. (See also W78-05222) (Sinha-OEIS)
W78-05644

SEISMICITY OF THE BEAUFORT SEA, BERING SEA AND GULF OF ALASKA,
National Geophysical and Solar Terrestrial Data Center, Boulder CO.
H. Meyers.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 17. Hazards, p 627-629, March 1977.

Descriptors: *Seismology, *Hazards, *Baseline studies, Resources development, Alaska, *Outer Continental Shelf, Offshore operations, Petroleum development, Beaufort Sea, Bering Sea, Gulf of Alaska.

The Alaskan region is one of the most seismic regions in the world. The location and design of drilling platforms, pipelines, storage and support facilities will have to take this factor into consideration. The objective of this research is to compile a historical file of earthquake data and present it in a fashion which would permit independent assessment of the seismic risk for various localities in Alaska. Three publications have been produced to date: 'A Historical Summary of Earthquake Epicenters in and Near Alaska', April 1976, NOAA Technical Memorandum EDS. NGSDC-1; 'Catalog of Tsunamis in Alaska, Revised 1976', March 1976, Preport SE-1; and 'An Analysis of Earthquake Intensities and Recurrence Rates in and Near Alaska', October 1976, NOAA Technical Memorandum EDS NGSDC-3. (See also W78-05222) (Sinha-OEIS)
W78-05645

FAULTING, SEDIMENT INSTABILITY, EROSION, AND DEPOSITION HAZARDS OF THE NORTON BASIN SEAFLOOR,
Geological Survey. Menlo Park, CA.
H. Nelson.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 18. Hazards, Data Management, p 1-129, March 1977.

Descriptors: *Hazards, *Faults(Geologic), *Erosion, *Seepage, Baseline studies, Alaska, Scour, Storm surge, Resources development, *Outer Continental Shelf, Norton Sound, Bering Strait, Petroleum development, Environmental conditions.

Preliminary assessment has been made on potential geological hazards of faulting, ice gouging, gas cratering of surface sediments, storm surge activity, and strong bottom currents. Present knowledge suggests that the Yukon delta and eastern Bering Strait areas have the combination of the most severe geologic hazards. Faulting and current scour are most intense in Bering Strait. Ice gouge, bottom current and storm surge activity are all intense in the extensive, shallow area off the modern Yukon subdelta. The severity and areal extent of gas cratering cannot yet be assessed, but it may well be the greatest problem of any in Norton Basin. The recent discovery of an apparent major petrogenic seep is likely to cause a quantum jump in interest and development schedule for Norton Basin. This points to the urgent need for a continued strong program of environmental research in this OCS area. (See also W78-05222) (Sinha-OEIS)
W78-05646

SEDIMENT TRANSPORT IN NORTON SOUND - NORTHERN BERING SEA, ALASKA,
Geological Survey, Menlo Park, CA.
D. A. Cacchione, and D. E. Drake.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 18. Hazards, Data Management, p 130-158, March 1977. 10 fig, 3 tab, 15 ref.

Descriptors: *Hazards, *Sediment transport, *Erosion, *Baseline studies, Pipelines, Structures, Alaska, Storms, Resources development, *Outer Continental Shelf, Norton Sound(AK), Petroleum development, Environmental conditions.

Both standard and novel methods of obtaining data on sediment transport in Norton Sound and other parts of the Northern Bering Sea were employed during the field program. Water samples, light transmission and current profiles taken at shipboard stations on R/V SEA SOUNDER during this period showed that the pattern of suspended sediment distribution in the surface and near-bottom layers reflect the high source area of the Yukon River. The comparison of the measured speed data, converted to a bottom stress using standard boundary layer analysis, with the measured sediment sizes at the GEOPROBE site suggests that current speeds in excess of 15-20 cm/sec will produce significant amounts of sediment resuspension. This computation, although only taken to be indicative and not definitive, warns

that rapid, local erosion during storms could be a hazard to bottom structures and pipelines. Two specific aspects of this research relate directly to the problem of oil spills at sea: first, excessive erosion can cause collapse of seafloor pipelines; second, the transport of oil near and along the sea floor will be controlled by those processes that also control the transport of sediments. (See also W78-05223) (Sinha-OEIS)
W78-05647

COASTAL PROCESSES AND MORPHOLOGY OF THE BERING SEA COAST OF ALASKA,
Geological Survey, Menlo Park, CA.
A. H. Sallenger, Jr., R. Hunter, and J. R. Dingler.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 18. Hazards, Data Management, p 159-225, March 1977. 23 fig, 8 tab, 44 ref.

Descriptors: *Hazards, *Storms, *Geomorphology, Baseline studies, Sediment transport, Alaska, Resources development, *Outer Continental Shelf, *Coastal processes, Bering Sea, Petroleum development, Environmental conditions.

Storms pose major hazards to coastal developments along the Alaskan Bering Sea coast. Shallow offshore depths that characterize much of the eastern Bering Sea shelf (particularly the northeast Bering Sea) make coastal areas susceptible to storm surges of large magnitude. Debris-line elevations resulting from a storm of November 1974, were measured and provided a combined measure of sea-level rise due primarily to wind stress, drop in barometric pressure, wave set-up and runup. Potential consequences of storms in this environment pose hazards to coastal developments in addition to hazards resulting from flooding and wave activity alone. (See also W78-05223) (Sinha-OEIS)
W78-05648

SEISMIC AND TECTONIC HAZARDS IN THE HOPE BASIN AND BEAUFORT SHELF,
Geological Survey, Menlo Park, CA.
S. Eittreim, and A. Grantz.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 18. Hazards, Data Management, p 226-268, March 1977. 11 fig, 1 tab, 14 ref.

Descriptors: *Hazards, *Seismic studies, *Baseline studies, Faults(Geologic), Alaska, Resources development, *Outer Continental Shelf, *Tectonics, Beaufort Sea, Hope Basin, Petroleum development, Slump features, Environmental conditions.

The Hope Basin and the Beaufort Shelf, both areas of considerable petroleum potential, contain what appear to be active tectonic features which may pose hazards to petroleum development. Hope Basin is composed of an intensely faulted section of young sediments in a trough appearing to be of Tertiary age. The present activity of these faults is uncertain, although they appear to rise to the surface in most places, cutting sediment which is within meters of the surface. The Beaufort Shelf has what appear to be active slump features on its outermost edge, both on the shelf and on the continental slope beyond. On the eastern Beaufort Shelf near Barter Island a zone of high seismicity exists which is as yet unexplained, tectonically, although it appears to be associated with a zone of young compressional folds. In general, the Beaufort Shelf is composed of prograding Tertiary sediments which in many places are cut by down-to-the-basin gravity faults. (See also W78-05223) (Sinha-OEIS)
W78-05649

SEISMICITY STUDIES: (A) NORTHEAST ALASKA AND (B) NORTON AND KOTZEBUE SOUNDS,
Alaska Univ., College. Geophysical Inst.
N. N. Biswas, L. Gedney, and P. Huang.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 18. Hazards, Data Management, p 269-315, March 1977. 14 fig, 5 tab, 10 ref, append.

Descriptors: *Seismic studies, *Hazards, *Baseline studies, *Sea ice, Alaska, Resources development, *Outer Continental Shelf, *Icequakes, *Ice mechanics, Norton Sound, Kotzebue Sound, Petroleum development, Environmental conditions.

This report describes the seismicity studies of two widely separated areas in Alaska: (1) seismic zone on the south of Barter Island in the Beaufort Sea and (2) seismic zone around Norton and Kotzebue Sounds. Results of the study suggest that the central Alaskan seismic zone continues uninterruptedly across the Brooks Range which previously appeared aseismic. Although the earthquakes detected are of small magnitude, their frequency of occurrence indicates that northeast Alaska is tectonically quite active. In the second area, three distinct swarms of icequakes were recorded by one station (Kotzebue) of the network in addition to earthquakes. Examination of the satellite imagery indicated a large scale ice flow from the Chukchi Sea to the Bering Sea during the swarms of icequakes. The study of Arctic ice mechanics has important implications in the offshore developments of the natural resources. (See also W78-05223) (Sinha-OEIS)
W78-05650

DATA MANAGEMENT.
Environmental Research Labs., Boulder, CO.
For primary bibliographic entry see Field 7C.
W78-05651

FINAL REPORT AND RECOMMENDATIONS FOR THE BIG CYPRESS AREA OF CRITICAL STATE CONCERN TO THE STATE OF FLORIDA ADMINISTRATION COMMISSION.
Florida State Dept. of Administration, Tallahassee. Div. of State Planning.
For primary bibliographic entry see Field 5G.
W78-05654

HAWAII COASTAL ZONE MANAGEMENT PROGRAM: TECHNICAL SUPPLEMENT 1. HAWAIIAN COASTAL WATER ECOSYSTEMS: AN ELEMENT PAPER FOR THE HAWAII COASTAL ZONE MANAGEMENT STUDY.
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 6G.
W78-05658

HAWAII COASTAL ZONE MANAGEMENT PROGRAM, TECHNICAL SUPPLEMENT 2. MANAGEMENT OF HAWAII'S COASTAL ZONE FOR WATER QUALITY OBJECTIVES,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 6G.
W78-05659

HAWAII COASTAL ZONE MANAGEMENT PROGRAM, TECHNICAL SUPPLEMENT 4. BEACHES: A COMPONENT OF THE COASTAL ZONE,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 6G.
W78-05660

HAWAII COASTAL ZONE MANAGEMENT PROGRAM: INUNDATIONS AND FORCES CAUSED BY TSUNAMIS FOR THE STATE OF HAWAII, OBSERVATIONS AND STATISTICAL PREDICTIONS. TECHNICAL SUPPLEMENT NO. 5,
Hawaii Univ., Honolulu.
C. L. Bretschneider, and P. G. Wybro.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 340, Price codes: A05 in paper copy, A01 in microfiche. Prepared for Pacific Urban Studies and Planning Program, University of Hawaii, May 1975, 88 p, 24 fig, 18 tab, 77 ref, append.

Descriptors: *Tsunamis, *Waves(Water), *Hawaii, *Coastal engineering, *Management, Earthquakes, Seismic waves, Shores, Flood profiles, Coastal structures, *Tsunami surges, *Coastal zone management, Wave force, Seismic detection.

Engineering evaluation was made of tsunami effects for the state of Hawaii. The most destructive tsunami on record in Hawaii is the one which inundated the shoreline in April 1946. Scientific data and theory are used as far as practical to obtain an engineering solution to the problem of tsunami-protection design. Techniques are studied and evaluated to determine the potential of tsunami run-up for Hawaii. Literature and observation reviews are included to set the data base for prediction of possible future run-up. The study concluded that tsunami inundation can be determined given the following information: the wave elevation at the coastline; the wave character; and the average value of the roughness of the terrain over which the wave might travel. (Zayac-NC)
W78-05661

HAWAII COASTAL ZONE MANAGEMENT PROGRAM: ENHANCEMENT OF COASTAL ZONE RECREATIONAL OPPORTUNITIES: A DESCRIPTION OF PRESENT COASTAL RECREATIONAL USAGE, CONSTRAINTS, DATA AND RESEARCH POSSIBILITIES IN THE STATE OF HAWAII. TECHNICAL SUPPLEMENT NO. 6,
Hawaii Univ., Honolulu. Dept. of Geography.
For primary bibliographic entry see Field 6B.
W78-05662

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

APPARATUS FOR EXTRACTING WATER FROM THE ATMOSPHERE,
Firma Technico Development and Financing S.A., Fribourg (Switzerland). (Assignee).
For primary bibliographic entry see Field 8C.
W78-05233

APPLICATION OF HIGH-TEMPERATURE HYPERFILTRATION TO UNIT TEXTILE PROCESSES FOR DIRECT RECYCLE,
Clemson Univ., SC. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 5D.
W78-05505

NATIONAL WATER SUPPLY AND IMPROVEMENT ASSOCIATION (NWSIA): WATER REUSE AND DESALINATION FOR THE FUTURE.
National Water Supply and Improvement Association, Ipswich, MA.
National Water Supply and Improvement Association Journal, Vol. 4, No. 1, 47 p, January 1977. 19 fig, 20 tab, 35 ref.

Descriptors: *Solar distillation, *Desalination, *Desalination plants, *Treatment facilities,

*Desalination processes, *Reclaimed water, *Water purification, *Potable water, *Water shortage, Impaired water use, Water resources development, Municipal wastes, Water management(Applied), Wastewater treatment, Imported water, Artificial recharge, Groundwater recharge, Water supply, Water utilization, Conservation, Heat transfer, Heat exchangers, California, Colorado, Virgin Islands, Energy requirements, Sea water distillation, Direct power and fuel consumption, Water reuse, Wastewater reclamation, Desalting sea water, Surface water importation, Groundwater pumping, Municipal wastewater, Yuma(AR), St. Croix.

Four articles are included in this journal issue. The first examines total energy requirements for a number of alternatives for water supply to California, including groundwater pumping, surface water importation, seawater desalting, and reclamation and reuse of wastewater. Total energy requirements include direct power and fuel consumption, and energy for construction of facilities, for supplying any chemicals used, for blending to modify the salt content of the water supply, and for treatment of municipal wastewater to meet current discharge regulations. The second paper presents the preliminary design for a solar assisted sea water distillation plant; the wiped-film rotating-disk evaporator equipment design is described. Data on rates of heat transfer and electrical energy required are presented. Estimates of the capital and operating costs indicate that distilled water could be produced more cheaply by the proposed plant than by conventional solar distillation using basin-type distilers. The third article presents a status report of the Colorado River Basin Salinity Control Project. A feasibility design of the Yuma Desalting Plant has been completed and negotiated desalting equipment contracts are awarded. The plant is scheduled to be fully operational in 1981. The fourth paper describes the efforts on the island of St. Croix in the Virgin Islands to desalinize seawater in water-short coastal areas to produce potable water. Programs coordinating the use of desalinized water with conservation measures such as wastewater reclamation, water reuse, and artificial groundwater recharge are described. (Seip-IPA)
W78-05532

PROCESS FOR THE PURIFICATION OF WATER,
Battelle Memorial Inst. (Switzerland). (Assignee).
For primary bibliographic entry see Field 5F.
W78-05607

EVALUATION OF SINGLE PASS SEAWATER REVERSE OSMOSIS MODULES AND PRETREATMENT TECHNIQUES,
David W. Taylor Naval Ship Research and Development Center, Annapolis, MD.
J. F. Pizzino.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031 635, Price codes: A03 in paper copy, A01 in microfiche. Report No. 76-0121, October, 1976. 23 p, 10 fig, 4 ref, 2 append. NAVSEA Task 17709, Task Area SSL 30002, Work Unit 2761-106.

Descriptors: *Reverse osmosis, *Desalination processes, Evaluation, Ships, Filtration, Separation techniques, Dissolved solids, Sea water, Potable water, Water supply, Water quality, Chlorination, Ultrafiltration, Pretreatment(Water).

Four reverse osmosis desalination modules were evaluated on natural sea water at Wrightsville Beach, North Carolina. Three of the modules were run on chlorinated and cartridge filtered sea water, and all showed permeate rate declines greater than 30 percent/1,000 hours. The fourth module, run on chlorinated, ultrafiltered sea water feed, showed an average permeate rate decline of 4.7 percent/1,000 hours operation after 3,800 total operating hours. Permeate total dissolved solids for all modules were consistently less than 500 parts per million. A high degree of filtration was necessary for the successful operation of such modules. The use of electrolytically generated chlorine to prevent membrane biological attack (and/or fouling) and to produce chlorinated potable water without the use of any chlorine compounds was considered successful. Principal advantages of reverse o smosis desalination are energy saving compared to conventional shipboard distillation systems, reduced weight and volume, lower maintenance requirements, safer operation, and the ability to provide chlorinated potable water without using dangerous chlorine compounds. (Wares-IPA)
W78-05620

MODEL STUDIES OF OUTFALL SYSTEMS FOR DESALINATION PLANTS. PART I, FLUME STUDY OF THE MIXING CHARACTERISTICS OF DENSE JETS DISCHARGED INTO A FLOWING FLUID, VOL I, MAIN TEXT. APPENDIX A: NOTATION. APPENDIX B: CONDUCTIVITY PROBE CALIBRATION AND DATA REDUCTION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5B.
W78-05689

MODEL STUDIES OF OUTFALL SYSTEMS FOR DESALINATION PLANTS, PART II. TESTS OF EFFLUENT DISPERSION IN SELECTED ESTUARY MODELS, VOLUME I. MAIN TEXT,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5B.
W78-05690

MODIFICATIONS OF ORNL'S COMPUTER PROGRAMS MSF-21 AND VTE-21 FOR THE EVALUATION AND RAPID OPTIMIZATION OF MULTISTAGE FLASH AND VERTICAL TUBE EVAPORATORS,
Oak Ridge National Lab., TN.
P. Glueckstern, J. V. Wilson, and S. A. Reed.
Available from the National Technial Information Service, Springfield, VA 22161 as ORNL/TM-5230, Price codes: A05 in paper copy, A01 in microfiche. Report No ORNL/TM-5230, June, 1976. 99 p, 3 tab, 6 ref, 15 append. W-7405-eng-26.

Descriptors: *Desalination plants, *Computer programs, *Operating costs, *Capital costs, *Cost analysis, Design, Technology, *Multistage flash(MSF) desalination process, *Vertical tube evaporator(VTE) desalination process, *ORNL, Subroutines, Cost updating, Input variables.

Design and cost modifications were made to ORNL's Computer Programs MSF-21 and VTE-21, originally developed for the rapid calculation and design optimization of multistage flash (MSF) and multieffect vertical tube evaporator (VTE) desalination plants. The modifications include additional design options which will make possible the evaluation of desalting plants based on current technology (i.e., the original programs were based on conceptual designs applying advanced and not yet proven technological developments and design features) and new materials and equipment costs updated to mid-1975. Subroutine changes are presented in appendices. (Seip-IPA)
W78-05692

3B. Water Yield Improvement

SUPPRESSION OF ICE FOG FROM COOLING PONDS,
Cold Regions Research and Engineering Lab., Hanover, NH.
For primary bibliographic entry see Field 2D.
W78-05359

RAINFALL FIELDS IN ISRAEL AND JORDAN AND THE EFFECT OF CLOUDING SEEDING ON THEM,
Hebrew Univ., Jerusalem (Israel). Inst. of Earth Sciences.
D. Sharon.
Journal of Applied Meteorology, Vol. 17, No. 1, p 40-48, January 1978. 9 fig, 16 ref.

Descriptors: *Weather modification, *Cloud seeding, *Rainfall, *Spatial distribution, Analytical techniques, Correlation analysis, Precipitation(Atmospheric), Arid lands, Storms, Foreign countries, Foreign research, Water resources, Nucleation, Effects, Variability, Meteorology, *Israel, *Jordan.

Spatial correlation functions of daily rainfall were derived separately for various parts of the study area and for unseeded and seeded days. The structure of respective rainfall fields was studied by means of the relationship between the geometry of iso-correlation contours of daily rainfall and the average geometry and/or kinematics of cloud systems that produce the rainfall. Results were obtained on (1) the prevalent direction of storm movement over the study area, and (2) the change in size of rainfall areas under varying conditions. Evidence was presented of an average increase of about 10 km in the dimensions of rainfall areas on seeded days. It was suggested that expanded rainfall areas have a twofold effect on the augmentation of the total yield of individual storms: (1) an increase of point rainfall resulting from prolonged exposure to moving cloud systems, and (2) an increase in the area thus affected. Consequently, the increase in water yield over the entire area covered by a storm may not be represented fully by point measurements. In the regional context, a contraction of storm areas was found in the transition to the arid zone. It was suggested that the size of rainfall areas is one of the fundamental factors controlling regional variations of rainfall as well as variations resulting from cloud seeding. (Sims-ISWS)
W78-05379

THE PRACTICABILITY OF DRY ICE FOR ON-TOP SEEDING OF CONVECTIVE CLOUDS,
Bureau of Reclamation, Miles City, MT.
E. W. Holroyd, III, A. B. Super, and B. A. Silverman.
Journal of Applied Meteorology, Vol 17, No 1, p 49-63, January 1978. 7 fig, 5 tab, 20 ref.

Descriptors: *Cloud seeding, *Crystallization, *Cloud physics, Weather modification, Clouds, Aircraft, Temperature, Air temperature, Crystals, Measurement, Data processing, Meteorology, *Dry ice seeding, Cumulonimbus clouds, Dry ice effectiveness.

Dry ice was shown to be an attractive agent for on-top seeding of convective clouds. A modest payload of small dry ice pellets can effectivcly seed dozens of clouds, depending on cloud volume encountered and on crystal concentrations desired. A dry ice pellet size of about 7 mm diameter was suggested for efficient use of seeding agent when dropped from the -10C level. Supercooled convective clouds that were seeded on-top with dry ice were investigated to determine empirical nucleation effectiveness values. The clouds were penetrated repeatedly to measure the resulting ice crystal concentrations. The experiments gave conservative effectivess values of 2 to 5 X 10 to the 11th power crystals per gram of dry ice, but with possible error bars extending an order of magnitude to each side of those values. A well-documented experiment giving effectiveness values twice as large was discussed in detail. (Sims-ISWS)
W78-05380

BIBLIOGRAPHY OF STATISTICAL AND METEOROLOGICAL METHODOLOGY IN WEATHER MODIFICATION,
Florida State Univ., Tallahassee. Dept. of Statistics.
M. A. Hanson, C. L. Bach, and E. A. Cooley.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A032 729, Price codes: A07 in paper copy, A01 in microfiche. FSU Statistics Report No. M388, ONR Technical Report No. 110, September 1976. 145 p. ONR N00014-76-C-0394.

Descriptors: *Weather modification, *Bibliographies, *Methodology, Meteorology, Weather, Weather forecasting, Forecasting, Statistics, Reviews, Publications.

This collection of abstracts was compiled within the Departments of Statistics and Meteorology at Florida State University for use in research in weather modification. It is envisaged that the bibliography will be of wide general use. The compilation involved a systematic search of all available relevant meteorological and statistical journals, report os symposia, cross checks of references in the sources, and the use of excellent reference material from selected texts on the subjects of meteorological methodology and weather modification. (Froehlich-ISWS)
W78-05591

PROJECT SKYWATER 1973-74 BIENNIAL REPORT.
Bureau of Reclamation, Denver, CO. Engineering and Research Center.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 952, Price codes: A23 in paper copy, A01 in microfiche. Report REC-ERC-76-21, December 1976. 551 p, 70 fig, 69 tab, 1 append.

Descriptors: *Weather modification, *Cloud seeding, *Precipitation(Atmospheric), *Colorado River Basin, *Great Plains, Rainfall, Snowfall, Cloud physics, Projects, Instrumentation, Radar, Model studies, Mathematical models, Statistical analysis, Rainfall-runoff relationships, Hydrology, Climatology, Environmental effects, Water resources, Water resources development, Social aspects, Social impact, Meteorology, *Project Skywater, Research contracts.

This report summarized atmospheric and environmental research conducted under the Bureau of Reclamation's precipitation management program in fiscal years 1973 and 1974. Chapter 1 outlined the project, its goals, and depth. The next three chapters consisted of summaries of the reports submitted by contractors who participated in the winter-orographic and summer-convective experiments and pilot programs of Project Skywater during the biennuim. The effects of weather modification on natural resources and processes and on socioeconomic and cultural patterns were the emphasis of numerous Skywater studies during the fiscal years 1973-1974. Summaries of these investigations were given in chapter 5. Chapters 6 and 7 described laboratory studies and in-house programs in support of Project Skywater. In a few cases, the contractors' reports covered a period longer than fiscal years 1973 and 1974. This was necessary to present a clear picture of the research activities and accomplishments. (Sims-ISWS)
W78-05594

3C. Use Of Water Of Impaired Quality

GROUND WATER IN THE KOEHN LAKE AREA, KERN COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-05442

WATER RESEARCH: SOLVING COLORADO'S WATER PROBLEMS,
Colorado State Univ Fort Collins. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W78-05481

PESTICIDE MODES OF ENTRANCE AND CONTENT IN WATER SUPPLIES, (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W78-05516

NATIONAL WATER SUPPLY AND IMPROVEMENT ASSOCIATION (NWSIA): WATER REUSE AND DESALINATION FOR THE FUTURE.
National Water Supply and Improvement Association, Ipswich, MA.
For primary bibliographic entry see Field 3A.
W78-05532

METHOD AND APPARATUS INTEGRATING WATER TREATMENT AND ELECTRICAL POWER PRODUCTION,
For primary bibliographic entry see Field 5F.
W78-05604

WASTEWATER: IS MUSKEGON COUNTY'S SOLUTION YOUR SOLUTION,
Environmental Protection Agency, Chicago, IL. Office of Research and Development.
For primary bibliographic entry see Field 5D.
W78-05687

3D. Conservation In Domestic and Municipal Use

WATER REQUIREMENTS AND APPLICATION RATES FOR LAWNS,
Wyoming Univ., Laramie. Dept. of Agricultural Engineering.
L. O. Pochop, J. Borrelli, J. R. Barnes, and P. K. O'Neill.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 808, Price codes: A03 in paper copy, A01 in microfiche. Wyoming Water Resources Research Institute, Laramie, Water Resources Series No. 71. February, 1978. 37 p, 3 fig, 10 tab, 14 ref, append. OWRT A-022-WYO(2), 14-34-0001-6053,7108.

Descriptors: *Water requirements, *Application rates, *Lawns, Irrigation efficiency, Water conservation, Consumptive use, Evapotranspiration, Municipal water, Water consumption, Water utilization, Cities, *Wyoming, Water demand, *Residential water use, *Summer vs. winter household use, Urban areas(Wyoming).

Lawn water application rates were measured for 55 homes in Laramie and Wheatland, Wyoming, during 1975 and 1976. In addition, evapotranspiration rates were measured at both cities during 1976. Lawn water application rates in 1976 were 122 percent of the average seasonal potential evapotranspiration rates in Laramie and 156 percent in Wheatland. The lowest application rates were near the consumptive use requirements of lawn grasses. The lawns were rated on the basis of appearance and according to the percentage of total lawn area that appeared to be stressed from visual inspection. There was no significant correlation between lawn water application rates and the appearance or stress ratings. Factors such as fertilizer, overall lawn maintenance habits, and uniformity of water application apparently exert strong influences on lawn appearance and stress. Overwatering amounted to 0.0085 acre-feet per day per acre of lawn in Wheatland while in Laramie it amounted to 0.004 acre-feet per day per acre of lawn. The average lawn size was 0.16 acres per home.
W78-05201

3E. Conservation In Industry

REGENERATION OF SPENT SULFURIC ACID (REGENERATION VON ABFALLSCHWEFELSAEURE),
Hoechst A. G., Frankfurt am Main (West Germany).
For primary bibliographic entry see Field 5D.
W78-05279

TOXIC WASTE TREATED BY WASTE RECOVERS USABLE CHEMICALS.
For primary bibliographic entry see Field 5D.
W78-05282

PROCESS FOR TREATMENT OF WASTE WATER EXHAUSTED FROM WATER-WASH SPRAY BOOTH USING WATER-SOLUBLE PAINT,
Nippon Paint Co. Ltd., Tokyo (Japan). (Assignee).
For primary bibliographic entry see Field 5D.
W78-05283

MECHANICAL PLATING,
Cadmium Association, London (England).
For primary bibliographic entry see Field 5D.
W78-05301

PLATING SYSTEM CUTS POLLUTION WOES.
For primary bibliographic entry see Field 5D.
W78-05309

RUSSIAN CLOSED-CYCLE CHEMICAL WORKS,
For primary bibliographic entry see Field 5D.
W78-05311

THE INTEGRATED STEELWORKS OF SOLMER AT FOS-SUR-MER.
For primary bibliographic entry see Field 5G.
W78-05312

SHOCK BACKWASH FILTER CUTS WASH WATER WASTE,
For primary bibliographic entry see Field 5D.
W78-05314

THE PRODUCTION OF CHEMICALS FROM PULPING WASTE,
Swedish Forest Products Research Lab., Stockholm.
For primary bibliographic entry see Field 5E.
W78-05316

POSSIBILITIES AND MEASURES TAKEN BY THE PULP INDUSTRY FOR THE PROTECTION OF THE ENVIRONMENT (MOEGLICHKEITEN UND MASSNAHMEN DER ZELLSTOFFINDUSTRIE IM INTERESSE DES UMWELTSCHUTZES).
For primary bibliographic entry see Field 5G.
W78-05318

METSA-BOTNIA'S KRAFT MILL COMES ON STREAM,
For primary bibliographic entry see Field 5D.
W78-05319

PULP AND PAPER RESEARCH AT UQTR--RELIEF FOR AN EMBATTLED INDUSTRY,
For primary bibliographic entry see Field 5E.
W78-05321

IS CHEAP RECOVERY IN SIGHT FOR SULFITE.
For primary bibliographic entry see Field 5E.

W78-05322

PULP INDUSTRY AND PROTECTION OF SURFACE WATERS (ZELLSTOFF-INDUSTRIE UND GEWAESSERSCHUTZ),
For primary bibliographic entry see Field 5G.
W78-05323

ECOLOGICAL ASPECTS OF WATER USAGE IN THE TEXTILE INDUSTRY,
CIBA-GEIGY Ltd., Basle (Switzerland).
For primary bibliographic entry see Field 5D.
W78-05325

EFFLUENT TREATMENT IN THE TEXTILE INDUSTRY,
Shirley Inst., Manchester (England).
For primary bibliographic entry see Field 5G.
W78-05327

MINI-SYMPOSIUM ON EFFLUENT CONTROL 'UPDATE 1976--GROUP IV',
Waste Water Engineers, Inc., Nashville, TN.
For primary bibliographic entry see Field 5D.
W78-05329

CUTTING (WATER) CONSUMPTION BY 95 PERCENT BY RECYCLING,
L. Freeman.
Paper Technology and Industry, Vol. 18, No. 4, p 118-120, April, 1977.

Descriptors: *Water conservation, *Pulp and paper industry, *Water reuse, Foreign countries, Europe, Water pollution control, *Recycling, Turbines, Filters, Settling basins, Drainage systems, Water pollution sources, England.

Water conservation measures (viz., replacing pass-out turbines with back-pressure turbines, recycling, and reducing city water consumption by installing filter plants and a settling pond to process river water) introduced at Wiggins Teape Ltd.'s Ely Paper Mills in Cardiff, South Wales (United Kingdom), have reduced total consumption from 9.7 to 5 million gal/day. New recycling and drainage schemes are being developed to cut water consumption to 0.5 million gal/day. (Swichtenberg-IPC)
W78-05445

EFFLUENT RECYCLE PRACTICES IN GROUNDWOOD/NEWSPRINT OPERATIONS,
Envirocon Ltd., Vancouver (British Columbia).
H. G. Burke, and D. R. Manolescu.
In: Canadian Pulp and Paper Association, Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), p 59-64. 2 fig, 2 tab.

Descriptors: *Pulp and paper industry, *Water reuse, *Water conservation, Water pollution control, Water pollution sources, North America, Foreign countries, Suspended solids, Biochemical oxygen demand, Recycling, Water pollution control, Recirculated water, Cooling water, Industrial water, Waste water(Pollution), Effluents, Pumps, Groundwood mills, Newsprint mills, Scandinavia, White water(Paper machines), Savealls.

A survey of groundwood newsprint mills in North America and Scandinavia indicates that present effluent discharges average 14,000 gal with 25-lb BOD and 52-lb suspended solids per ton of newsprint. Suggestions to reduce effluent losses include reuse of press water, a reduction in rejects from centrifugal cleaners, adequate broke and white water storage capacities, use of only white water for grinder cooling and machine showers, use of white water savealls, and a reduction in the amount of water use to seal vacuum pumps. An effluent discharge of 4,000 gal with 20-lb BOD and 20-lb suspended solids per ton of newsprint is an achievable goal using existing technology. (Swichtenberg-IPC)
W78-05468

REDUCTION OF SOLIDS AND FIVE-DAY BOD LOSSES THROUGH PROCESS MODIFICATION AND PHYSICO-CHEMICAL PRIMARY TREATMENT AT FRASER PAPER LTD,
Fraser Companies Ltd., Edmundston (New Brunswick).
For primary bibliographic entry see Field 5D.
W78-05469

EFFECT OF STEAM PURITY ON PERFORMANCE, RELIABILITY AND MAINTENANCE OF INDUSTRIAL STEAM TURBINES,
General Electric Co., Lynn, MA.
For primary bibliographic entry see Field 8G.
W78-05476

PAPER MILL WASTE PURIFICATION--BY PASSING THROUGH FILTRATION MATERIAL CONTAINING POSITIVELY CHARGED PERLITE PARTICLES.
For primary bibliographic entry see Field 5D.
W78-05501

HYGIENIC ASSESSMENT OF THE USE OF PURIFIED WASTE-WATERS IN CLOSED WATER CYCLES IN CARDBOARD FACTORIES (SANITARNOGIGIENICHESKAIA OTSENKA ISPOL'ZOVANIIA OCHISHCHENNYKH STOCHNYKH VOD V ZAMKNUTYKH TSIKLAKH VODOSNABZHENIIA KARTONOVYKH FABRIK),
For primary bibliographic entry see Field 5D.
W78-05503

APPLICATION OF HIGH-TEMPERATURE HYPERFILTRATION TO UNIT TEXTILE PROCESSES FOR DIRECT RECYCLE,
Clemson Univ., SC. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 5D.
W78-05505

POLLUTION CONTROL IN TEXTILE DYEING INDUSTRY (SENSHOKU HAISUI ODOKU BOSHI GIJUTSU NI KANSURU KENKYU),
For primary bibliographic entry see Field 5D.
W78-05509

DEVELOPMENT STATUS AND ENVIRONMENTAL HAZARDS OF SEVERAL CANDIDATE ADVANCED ENERGY SYSTEMS,
Lockheed Missiles and Space Co., Inc., Huntsville, AL. Huntsville Research and Engineering Center.
For primary bibliographic entry see Field 5G.
W78-05538

INDUSTRY-SPECIFIC GROSS OUTPUT MULTIPLIERS FOR BEA ECONOMIC AREAS.
Department of Commerce, Washington, DC. Div. of Regional Economic Analysis.
For primary bibliographic entry see Field 6A.
W78-05655

3F. Conservation In Agriculture

PRESERVING THE ENVIRONMENT OF A SANDHILLS REGION CONCURRENT WITH INTENSIVE IRRIGATION DEVELOPMENT,
Nebraska Univ., Lincoln. Water Resources Center.
R. A. Olson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 038, Price codes: A06 in paper copy, A01 in microfiche. Completion Report, August 30, 1976. 45 p, 6 fig, 54 tab. OWRT C-5046(No. 4225)(1).

Descriptors: *Nitrogen compounds, *Fertilizers, *Cultivation, Harvesting, *Crop production, *Corn(Field), *Soil management, *Soil stabilization, *Irrigation practice, *Erosion control, *Nebraska, Wind erosion, Organic matter, Herbicide, Post-emergents, Pre-emergents, Pesticides, Insect control, Bromegrass, Orchardgrass, Tillage techniques, N efficiency, *N-15 tracer techniques, Fertilizer management, *Sandy soil management, Leafhopper control, Sandbur, Organic matter maintenance, Butylate, Atrazine, EPTC herbicide, Methoxyclor.

The long-term influence of nitrogen rate (N-rate), tillage, and harvest practice on soil properties including organic matter, the influence of dry matter accumulation, and N utilization by corns was also investigated in McPherson County, Nebraska. Tracer techniques with N-15 depleted fertilizer materials indicated that appreciable quantities of fertilizer N were immobilized in the soil's organic content. Conventional N carriers effected higher yields of corn and bromegrass and caused a greater reduction in soil pH than equivalent rates of slow-release N carrier materials. No measurable changes in soil organic matter content resulted from tillage method, harvest procedure or N-rate; disk tillage afforded higher grain yields and greater N uptake than did sod-plant tillage. Total herbage yields of orchardgrass increased with increasing N-rate. Herbage yield increased with an increased number of clippings (simulated grazing) at low N rate, but decreased at higher N rates, attributable to stand loss in the orchardgrass. Investigation of methods of planting corn into grass sod with the objective of maintaining a continuous ground cover for controlling wind erosion revealed equivalent yields when the grass sod was destroyed by cultivation or was retarded in growth by appropriate herbicide treatment. Small amounts of fertilizer N greatly increased leafhopper populations; additional amounts had no further effect. Methoxychlor treatment prored effective for suppressing leafhoppers. Field sandburs are very competitive with irrigated corn grown under center-pivot irrigation on sandy soils, requiring 6 weeks of weed control after planting to eliminate corn yield losses. Required concentrations of butylate, atrazine, EPTC for effective sandbur control are presented. (Seip-IPA)
W78-05348

ECONOMIC EFFECT ON AGRICULTURAL PRODUCTION OF ALTERNATIVE ENERGY INPUT PRICES: TEXAS HIGH PLAINS,
Texas A and M Univ., College Station. Water Resources Inst.
B. M. Adams, R. D. Lacewell, and G. D. Condra.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 039, Price codes: A07 in paper copy, A01 in microfiche. Technical Report No. 73, June, 1976. 138 p, 5 fig, 45 tab, 38 ref, 5 append. OWRT A-033-TEX(1).

Descriptors: *Linear programming, *Mathematical models, Energy, *Prices, Crops, Agriculture, *Crop production, *Productivity, *Net profit, Natural gas, Water rates, Economic impact, Mathematical studies, Texas, *Energy prices, *Agricultural production, *Commodity prices, Diesel prices, Nitrogen prices, Water prices, Natural gas prices, *Texas High Plains.

Short-run effects of rising energy prices on agricultural production were evaluated through mathematical linear programming; results are measured by demand schedules, net revenue adjustments, cropping pattern shifts, and changes in agricultural output. Only variable costs were used in constructing the objective function. Demand schedules were estimated and crop enterprise

budgets were adapted. The completed model was applied to 16 imput/product price combinations feasible in the short-run future. Diesel consumption would change very little unless commodity prices decline below the lowest prices since 1971 or unless diesel price approaches $2.00/gal. Under average commodity prices, natural gas consumption would not decline until the price rose about $4.00/1000 cu ft (mcf) and would remain stable as long as the price was below $1.28/mcf. Nitrogen use would be immediately affected by a price increase to above $0.40/lb. Less than 4% reduction in consumption would result from a water price change from zero to $22/acre ft. At a wate price of $71.71/acre ft, consumption would drop to zero. rising input prices cause acreage shifts from irrigated to dryland; however, with average commodity prices, these shifts do not occur until: (1) diesel reaches $2.69/gal; (2) natural gas reaches $1.92/mcf; (3) nitrogen is $0.41/lg; or (4) water reaches $14.69/acre ft. Rising energy prices significantly impact net revenue to the farmer, whose net income above variable cost approaches $500 million at present diesel prices of $0.40. Diesel prices of $0.81 and $1.86/gal would cost $79 million and $254 million, respectively in farmer net revenue. Increased costs of natural gas, nigrogen, and water directly reduce net revenue. Commodity prices affect agricultural production more than energy input prices. (Seip-IPA)
W78-05350

MEANS AND METHOD OF IRRIGATION CONTROL,
D. L. Caldwell.
U.S. Patent No. 4,040,436, 8 p, 10 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 961, No 2, p 588, August 9, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation efficiency, Irrigation effects, Soil-water-plant relationships, Soil properties, Control, Water requirements.

A means and method of irrigation control is described where a porous sensor is placed in the root zone in moisture transfer relation with the soil, and is supplied with air at a pressure sufficient to cause progressively increasing seepage of air through the sensor as soil moisture is lessened. Means for detecting the rate of seepage of air is utilized to indicate moisture content of the soil for manually or automatically activing a timer for the irrigation system. The irrigation control includes the use of several sensors placed at different soil levels, as wel as a warning sensor adapted to be activated should the soil start to become drier than its normal relatively moist condition. Another embodiment utilizes one or more selected plants with corresponding sensors as a means of detecting sudden weather changes to anticipate changes in ground moisture. A further embodiment utilizes an evaporation measuring means designed to detect incipient change in humidity ir cative of sudden weather change. (Sinha - OEIS)
W78-05598

WATER CONDUCTING AND EMITTING DEVICE,
G. Gilead.
U.S. Patent No. 4,053,109, 6 p, 11 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 963, No 2, p 527, October 11, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation efficiency, Irrigation practices, Application equipment, Drip irrigation.

Two continuous hose like elements for use as a supply conduit of irrigation water extending within one another form a conduit for water between the outer wall of the inner and the inner wall of the outer hose. Openings are provided in the wall of the inner element establishing communication between the inner hose leading from the conduit into the open. The outer hose element is of slightly larger diameter than that of the inner one - the difference being in the range of 2-6 millimeters; the outer hose is spirally grooved and the inwardly extending ridges of the helix contact are immediately fused to the inner ungrooved hose. In that way a helical path of very small cross sectional area is formed. (Sinha-OEIS)
W78-05605

APPARATUS FOR REMOVING PARTICLES FROM WATER FOR SPRINKLERS AND THE LIKE,
J. M. Miller.
U.S. Patent No. 4,053,413, 10 p, 12 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 963, No 2, p 626, October 11, 1977.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, Irrigation efficiency, Irrigation practices, Screens, Filters, Equipment.

A fine mesh, cylindrical screen is mounted on a cylindrical support lengthwise of a ditch and rotated about its axis. The screen is over half submerged, leaving 30% of its area above the normal water level. The rotating screen, at its downstream end, abuts the pipe through which the water flows to a pump for supplying the sprinklers. As the screen rides up out of the water, the sediment clings to it. At the downstream end is a nozzle which discharges a jet of water to move the sediment longitudinally and to a position of engagement with a jet of water from a second nozzle spaced both longitudinally and circumferentially from the first nozzle. These nozzles are included in a series of nozzles which are similarly spaced to the upstream end, with the jet from the last nozzle moving the collected sediment to a position where it can be engaged by a suction nozzle just before the screen reenters the water. (Sinha-OEIS)
W78-05610

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

NUTRIENTS: A MAJOR CONSIDERATION IN INTENSIVE FOREST MANAGEMENT,
Northeastern Forest Experiment Station, Durham, NH.
J. W. Hornbeck.
Available from the USDA Forest Service, 370 Reed Rd., Broomall, Pa. 19008. In: Proceedings of the Symposium on Intensive Culture of Northern Forest Types. USDA Forest Service General Technical Report NE-29, p. 241-250, 1977. 3 tab, 19 ref.

Descriptors: Forest management, *Nutrients, *Nitrogen, Calcium, Streamflow, *Clearcutting, Whole-tree-harvesting, Stem-only-harvesting, Leaching losses, *Nutrient cycling.

Estimates of nutrient losses are compared for a stem-only harvest versus a whole-tree harvest of a clearcut northern hardwood stand. Combined nutrient losses due to increased leaching to streamflow and removal of vegetation after stem-only harvesting are estimated to be 334 kg/ha for nitrogen. For a whole-tree harvest, combined losses are estimated at 537 kg/ha for calcium and 486 kg/ha for nitrogen. (Forest Service)
W78-05250

ANALYSIS OF THE SEASONAL STREAMFLOW VARIATION FOR THE PRIMARY UNREGULATED WATER COURSES IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-05356

WATER AVAILABLE FOR RUNOFF FOR 4 TO 15 DAYS DURATION IN THE SNAKE RIVER BASIN IN IDAHO,
National Oceanic and Atmospheric Administration, Silver Spring, MD. Office of Hydrology.
R. H. Frederick, and R. J. Tracey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 427, Price codes: A03 in paper copy, A01 in microfiche. NOAA Technical Memorandum NWS HYDRO-29, June 1976. 39 p, 14 fig, 8 tab, 13 ref.

Descriptors: *Idaho, *Runoff forecasting, *Snowmelt, *Frequency analysis, *Water balance, Runoff, Flow duration, Precipitation(Atmospheric), Watersheds(Basins), Climates, Ablation, *Snake River Basin(Idaho), Melt factor.

Through adaptation of the National Weather Service Forecast System (NWSRFS) Snow Accumulation and Ablation model, this study estimated the frequency of water available for runoff (WAR) from snowmelt and precipitation over the agricultural areas of Idaho's Snake River Basin. The report outlined the adaptation, testing, and use of the NWSRFS model, presented maps of 4- and 15-day WAR values at return periods of 2 and 100 years, and discussed seasonal variation of WAR and differences between WAR-frequency and precipitation-frequency values. (Lardner-ISWS)
W78-05365

AUTORUN ANALYSIS OF HYDROLOGIC TIME SERIES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power.
For primary bibliographic entry see Field 2E.
W78-05386

A GUIDE TO ENVIRONMENTAL PLANNING AND DEVELOPMENT, (LEHIGH-NORTHAMPTON COUNTIES JOINT PLANNING COMMISSION),
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
For primary bibliographic entry see Field 6B.
W78-05394

REGIONAL STORM DRAINAGE PLAN, (LEHIGH-NORTHAMPTON JOINT PLANNING COMMISSION).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
For primary bibliographic entry see Field 6F.
W78-05397

REGIONAL STORM DRAINAGE PLAN-1977 SUPPLEMENT, (LEHIGH-NORTHAMPTON JOINT PLANNING COMMISSION),
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
For primary bibliographic entry see Field 6F.
W78-05398

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT: MAIN REPORT.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05400

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT: APPENDIX B - FOUNDATION FOR LEGAL ANALYSIS.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05401

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT. APPENDIX C - FEDERAL AND STATE AGENCY PROFILES.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05402

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT. APPENDIX D; VOLUME I - CASE STUDIES D.1.1 TO D.5.1.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05403

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT, APPENDIX D, VOLUME II, CASE STUDIES D.6.1 TO D.13.1.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05404

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT, APPENDIX D, VOLUME III, CASE STUDIES D.14.1 TO D.22.1.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05405

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT, APPENDIX D, VOLUME IV, CASE STUDIES D.23.1 TO D.29.1.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05406

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT: APPENDIX E--CONSOLIDATED BIBLIOGRAPHY.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05407

THE EVALUATION OF WATER AND RELATED LAND RESOURCE PROJECTS: A PROCEDURAL TEST.
Oklahoma Univ., Norman. Dept. of Civil Engineering and Environmental Science.
For primary bibliographic entry see Field 6B.
W78-05408

FLOOD PLAIN INFORMATION: MILL CREEK, RIPLEY, WEST VIRGINIA, AND VICINITY.
Army Engineer District, Huntington, WV.
Prepared for State of West Virginia, Department of Natural Resources, Division of Water Resources, June 1971. 33 p, 8 fig, 9 plates, 8 tab.

Descriptors: *West Virginia, *Streamflow forecasting, *Flood profiles, *Historic floods, *Flood data, Floods, Flood flow, Indirect flood measurement, Flood forecasting, Storms, Flood stages, Peak discharge, Stage-discharge relations, Flood damage, Flood plains, Standard Project Flood, Flood protection, Non-structural alternatives, Land use, Planning, Control structures, *Mill Creek(WV), Ripley(WV), Intermediate Regional Flood.

The study area includes Mill Creek and its flood plain in the vicinity of Ripley, West Virginia. The flood plain contains some residential and commercial land uses that have been flooded an average of once every three years. Flood data were obtained from topographic maps, field studies, historical sources, floodcrest records, and hydrologic data from similar watersheds in the region. Stream gage records for the study area were not available. The main flood season occurs from late winter to early spring and results from heavy general rainfall. Intense local thunderstorms may cause flooding at other times. The worst known flood occurred on March 7, 1967, cresting 22.5 feet above flood stage. Damages from this flood were valued between $100,000 and $200,000. At the same location, the Intermediate Regional Flood would crest 26 feet above flood stage and would discharge 12,100 cubic feet per second (cfs), while the Standard Project Flood would crest 36 feet above flood stage and would discharge 40,500 cfs. Several bridges in the study area would impede these flood flows. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05409

FLOOD PLAIN INFORMATION: OHIO RIVER, POPE AND HARDIN COUNTIES, ILLINOIS.
Army Engineer District, Louisville, KY.
Prepared for Pope and Hardin County Commissioners, IL, June 1976. 20 p, 10 fig, 22 plates, 4 tab.

Descriptors: *Illinois, *Flood forecasting, *Flood data, *Stage-discharge relations, Floods, Flood flow, Design flood, Flood profiles, Storms, Historic floods, Flood stages, Flood plains, Flood protection, Non-structural alternatives, Warning systems, Land use, Planning, Control structures, Levee, Floodwalls, *Ohio River(IL), Pope County(IL), Hardin County(IL), Elizabethtown(IL), Rosiclare(IL), Golconda(IL), Intermediate Regional Flood, Project design flood.

The study area involves the portions of Pope and Hardin counties, Illinois that are subject to flooding from the Ohio River. Included are the communities of Elizabethtown, Rosiclare and Golconda. The flood plain is mostly undeveloped with a sprinkling of industrial and residential land uses. Golconda and Rosiclare are protected from Ohio River flooding by a series of floodwalls and levees constructed after the 1937 flood, which provide protection to 3 feet above the 1937 flood height. Similar flood control projects have been authorized for Elizabethtown and Cave-in-Rock but have not been constructed. Flood data were obtained from topographic maps, field studies, historical sources, and stream gage records. The main flood season occurs from January through April and results from heavy general rainfall combined with snowmelt. The worst flood recorded in the study area at Lock and Dam 51 occurred in January 1937, cresting at 356.7 feet mean sea level (msl). At the same location, the Intermediate Regional Flood would crest at 350.6 feet msl. The only manmade obstructions to flood flows that cross the river are Lock and Dams 50 and 51. Neither structure has substantial effect on flood magnitudes. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05410

FLOOD PLAIN INFORMATION: OHIO RIVER AND MASSAC CREEK, CITY OF METROPOLIS AND MASSAC COUNTY, ILLINOIS.
Army Engineer District, Louisville, KY.
Prepared for City of Metropolis and Massac County, July 1975. 28 p, 14 fig, 18 plates, 9 tab.

Descriptors: *Illinois, *Flood forecasting, *Flood data, Floods, Flood flow, Design flood, Flood profiles, Historic floods, Flood stages, Peak discharge, Stage-discharge relations, Flood plains, Flood protection, Non-structural alternatives, Warning systems, Land use, Planning, Control structures, Levee, Floodwalls, *Ohio River(IL), *Massac Creek(IL), Massac County(IL), Metropolis(IL), Brookport(IL), Intermediate Regional Flood, Project design flood.

The study area involves the portions of Massac County, Illinois that are subject to flooding from the Ohio River and Massac Creek. Included are the towns of Brookport and Metropolis. The flood plain is mostly undeveloped in rural areas. Brookport is protected by a levee constructed following the devastating 1937 flood on the Ohio River. It consists of concrete wall and rolled earth levee and affords protection to the height of the 1937 flood plus 3 feet. Flood protection projects have been authorized for the city of Metropolis but have not yet been constructed. Commercial and residential developments in Metropolis occupy the flood plain. Flood data were obtained from topographic maps, field studies, historical sources, and gage records on the Ohio River. The main flood season occurs from January through April and results from prolonged heavy rainfall combined with snowmelt. Backwater flooding on Massac Creek may result from high stages on the Ohio River. The worst flood recorded at Metropolis occurred in February 1937, discharging 1,850,000 cubic feet per second (cfs) and cresting at 342.9 feet mean sea level (msl). At the same location, the Intermediate Regional Flood (IRF) would discharge 1,270,000 cfs, cresting at 334 feet msl. Historic and future flood profiles are presented for the entire study area. This report is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05411

FLOOD PLAIN INFORMATION: EMBARRAS RIVER AND TRIBUTARIES, CHARLESTON, ILLINOIS.
Army Engineer District, Louisville, KY.
Prepared for City of Charleston, IL, January 1976, 32 p, 16 fig, 35 plates, 5 tab.

Descriptors: *Illinois, *Flood forecasting, *Flood profiles, *Flood data, *Flood stages, Floods, Flood flow, Streamflow forecasting, Historic floods, Peak discharge, Stage-discharge relations, Flood plains, Standard Project Flood, Flood protection, Non-structural alternatives, Flood plain insurance, Warning systems, Land use, Planning, Control structures, *Embarras River(IL), Charleston(IL), Coles County(IL), Intermediate Regional Flood.

The study area includes the portions of Coles County and the City of Charleston, Illinois that are subject to flooding by the Embarras River and its tributaries. The flood plain is mostly undeveloped except in Charleston, where residential and commercial land uses predominate. With continuing urban expansion the flood plains will come under increasing pressure for development. Flood data were obtained from topographic maps, historical sources, stream and bridge cross sections, and field studies. Stream gage and flood elevation records were not available. The main flood season occurs during winter and spring, resulting from intense local thunderstorms or heavy general rainfall. The worst flood recorded at the U.S. Geological Survey gage located 70 miles downstream from the study limit occurred in June 1957. The Intermediate Regional Flood on the Embarras River, upstream from its confluence with Kickapoo Creek, would discharge 36,200 cubic feet per second (cfs), while the Standard Project Flood would discharge 72,000 cfs. Past flood elevation records were unsatisfactory for comparison with projected floods. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05412

FLOOD PLAIN INFORMATION: SUSSEX COUNTY, VIRGINIA, NOTTOWAY RIVER, VIRGINIA.
Army Engineer District, Norfolk, VA.
Prepared for Sussex County, VA, March 1976, 28 p, 8 fig, 40 plates, 8 tab.

Descriptors: *Virginia, *Flood forecasting, *Flood profiles, *Historic floods, *Flood data, Floods, Flood flow, Indirect flood measurement, Storms, Flood stages, Peak discharge, Stage-discharge relations, Flood plains, Standard Project Flood, Flood protection, Non-structural alternatives, Building codes, Land use, Planning, Control structures, *Nottoway River(VA), Sussex County(VA), Stony Creek(VA), Intermediate Regional Flood.

The study area includes the portions of Sussex County, Virginia that are subject to flooding by the Nottoway River and Stony Creek. The flood plain is mostly undeveloped or agricultural except in the town of Stony Creek, where some development of the flood plain has taken place. Flood data were obtained from topographic maps, field studies, historical sources, and stream gage records. Flooding may occur at any time of year and is caused by intense local rainfall or tropical disturbances. The worst flood recorded at the U.S. Geological Survey gage on the Nottoway River near Stony Creek occurred on August 17, 1940, discharging 25,200 cubic feet per second (cfs) and cresting 82.08 feet mean sea level (msl). Another large flood, in October 1972, discharged 20,800 cfs at the same location, cresting at 80.1 feet msl. At the same location, the Intermediate Regional Flood would discharge 26,000 cfs and would crest at 82.9 feet msl, while the Standard Project Flood would discharge 39,000 cfs and would crest at 84.5 feet msl. Historic flood damages have not severely affected residential land uses, but agricultural losses have been critical. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05413

FLOOD PLAIN INFORMATION: YELLOWSTONE RIVER, LIVINGSTON, MONTANA.
Army Engineer District, NE.
Prepared for Park County, Montana, and Montana Department of Natural Resources, Helena, November 1974. 34 p, 16 fig, 11 plates, 3 tab.

Descriptors: *Montana, *Streamflow forecasting, *Flood forecasting, *Flood profiles, *Flood data, Floods, Flood flow, Indirect flood measurement, Storms, Historic floods, Flood stages, Peak discharge, Stage-discharge relations, Flood plains, Standard Project Flood, Flood protection, Non-structural alternatives, Warning systems, Land use, Planning, Control structures, Levee, Livingston(MT), *Yellowstone River(MT), Intermediate Regional Flood.

The study area includes the Yellowstone River and its flood plain for approximately six miles upstream and six miles downstream from Livingston, Montana. The flood plain contains commercial, residential, public utility, and industrial land uses, with some land either undeveloped or reserved for open space. Flood data were obtained from topographic maps, field studies, historical sources, and stream gage records. The main flood season occurs in May and June, resulting from snowmelt supplemented by rainfall. Intense local rainfall at other times on small watersheds tributary to the Yelowstone River may also cause flooding at Livingston. Existing structural flood control measures afford protection from small floods. The worst flood recorded at the U.S. Geological Survey gage south of Livingston occurred on June 19, 1974, discharging 35,300 cubic feet per second (cfs). At the same location, the Intermediate Regional Flood (IRF) would discharge 43,000 cfs, while the Standard Project Flood (SPF) would discharge 60,000 cfs. Three bridges in the study area would be overtopped by the SPF. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05414

FLOOD PLAIN INFORMATION: GREAT FALLS, MONTANA, VOLUME II, MISSOURI RIVER.
Army Engineer District, Omaha, NE.
Prepared for City of Great Falls, Cascade County, Montana, June 1974. 30 p, 13 fig, 6 plates, 2 tab.

Descriptors: *Montana, *Streamflow forecasting, *Flood profiles, *Flood data, Floods, Flood flow, Indirect flood measurement, Storms, Historic floods, Flood stages, Peak discharge, Stage-discharge relations, Flood plains, Standard Project Flood, Flood protection, Warning systems, Land use, Planning, Control structures, Dams, Great Falls(MT), *Missouri River(MT), Cascade County(MT), Intermediate Regional Flood.

The study area includes the Missouri River and its flood plain from the Black Eagle Dam to a point 3.5 miles upstream from Great Falls, Montana. Development on the flood plain consists of residential, agricultural, recreational, and industrial land uses. Flood data were obtained from topographic maps, field studies, historical sources and stream gage records. The main flood season occurs during May and June, resulting from heavy rain combined with snowmelt. Canyon Ferry Reservoir has been used for flood control storage since 1966. The worst flood recorded at Black Eagle Dam occurred on June 7, 1908, and discharged 120,000 cubic feet per second (cfs). Great Falls experienced more extensive damage from the 76,000 cfs discharge of the June 10, 1964 flood due to greater flood plain development. Another large flood, discharging 62,000 cfs, occurred in 1953. At Great Falls, the Intermediate Regional Flood will discharge 49,000 cfs, while the Standard Project Flood would discharge 100,000 cfs. These floods would be more serious if existing structural flood controls had not been constructed. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. Volume I of this report identified flood characteristics for the Sun River, which joins the Missouri River at Great Falls. (Nessa-NC)
W78-05415

FLOOD PLAIN INFORMATION: BEAVERHEAD RIVER, DILLON, MONTANA.
Army Engineer District, Omaha, NE.
Prepared for Beaverhead County, Montana, June 1975, 27 fig, 8 plates, 7 tab.

Descriptors: *Montana, *Streamflow forecasting, *Flood profiles, *Flood data, *Flood recurrence interval, Floods, Flood flow, Indirect flood measurement, Historic floods, Flood stages, Peak discharge, Stage-discharge relations, Flood plains, Ice jams, Standard Project Flood, Flood protection, Non-structural alternatives, Warning systems, Land use, Planning, Control structures, Beaverhead County(MT), *Beaverhead River(MT), Dillon(MT), Intermediate Regional Flood.

The study area includes the Beaverhead River and its flood plain from approximately 4 miles upstream to 4 miles downstream from Dillon, Montana. The flood plain in Dillon contains residential and commercial land uses. Outside of Dillon, the flood plain contains undeveloped or agricultural lands. Flood data were obtained from topographic maps, historical sources, field studies and stream gage records. The main flood season occurs in mid to late winter and mid to late spring. Ice jam flooding occurs during the winter, and snowmelt flooding occurs in the spring. Flooding may occur from January through September. The worst flood recorded at Dillon occurred on June 21, 1964, discharging 1,740 cubic feet per second (cfs) and cresting 6.63 feet above flood stage. At the downstream limit of the study area, the Intermediate Regional Flood will discharge 3,400 cfs, while the Standard Project Flood will discharge 5,900 cfs. Bridges in the study area will have only a small effect on these floods, causing an increase in flood heights of one foot or less. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05416

FLOOD HAZARD ANALYSES REPORT: HOCKING RIVER WITH RUSH CREEK, PLEASANT RUN, BLUE VALLEY, BALDWIN RUN, FETTERS RUN, EWING RUN AND TARHE RUN, FAIRFIELD COUNTY, OHIO.
Soil Conservation Service, Columbus, OH.
April 1977, 26 p, 8 ref, 4 fig, 5 tab, append, 4 exhibits, glossary.

Descriptors: *Flood control, *Flood profiles, *Flood plains, *River basin development, *Ohio, Flood damage, Building codes, Flood frequency, Flood data, Flood plain insurance, Flood plain zoning, Warning systems, Flood protection, Non-structural alternatives, Regulation, Floodproofing, Management, Legal aspects, Floods, Control structures, *Hocking River(OH), *Fairfield County(OH), *Flood plain management, Rush Creek(OH), Pleasant Run(OH), Blue Valley(OH), Baldwin Run(OH), Fetters Run(OH), Ewing Run(OH), Tarhe Run(OH).

Fairfield County is subject to growing flood damages due to existing and increasing urbanization in its flood plain areas. The most severe flood occurred in July 1948, discharging 11,200 cubic feet per second (cfs) at the mouth of Hunters Run, with over $1,000,000 in damages. Local citizens and officials have expressed a desire to prevent further development which would receive similar damages from future floods. This report is intended to serve as the technical base from which local flood plain management decisions can be made. After a survey of flood history and projected flood potential, the regulatory floodplain was divided into two districts: the floodway--the floodplain borders reached by a 0.5 foot rise in water surface; and the floodway fringe--that area between the floodway and the boundaries of the 100-year flood. These two districts are to be used in conjunction with the recommendations to regulate floodplain development and achieve wise floodplain use. Recommendations include: increasing efforts for public participation; floodplain acquisition where zoning regulations are not enacted; analyzing the need for structural measures; providing for the enforcement of existing regulations through the Fairfield County Regional Planning Commission; identifying on-site flood boundaries and floodways within the county; and a continuing effort for regional administration, regulation and information use. (Zayac-NC)
W78-05417

UNITED STATES GEOLOGICAL SURVEY YEARBOOK, FISCAL YEAR 1977.
Geological Survey, Reston, VA.
For primary bibliographic entry see Field 9D.
W78-05419

THE INFLUENCE OF CLIMATE ON FLOODS IN SMALL BASINS, AS DEFINED BY RAINFALL-RUNOFF MODELING,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2E.
W78-05423

DRAINAGE AREAS FOR JEFFERSON COUNTY, ALABAMA,
Geological Survey, Montgomery, Al.. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05427

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 1. CENTRAL AND NORTHERN LOUISIANA.
Geological Survey, Baton Rouge, LA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05428

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 2. SOUTHERN LOUISIANA.
Geological Survey, Baton Rouge, LA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05429

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 3. COASTAL LOUISIANA,
Geological Survey, Baton Rouge, LA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05430

TECHNIQUES FOR ESTIMATING FLOOD-DEPTH FREQUENCY RELATIONS ON NATURAL STREAMS IN GEORGIA,
Geological Survey, Doraville, GA. Water Resources Div.
For primary bibliographic entry see Field 2E.
W78-05443

WATER RESEARCH: SOLVING COLORADO'S WATER PROBLEMS,
Colorado State Univ Fort Collins. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W78-05481

MULTIOBJECTIVE ANALYSIS IN THE MAUMEE RIVER BASIN: A CASE STUDY ON LEVEL-B PLANNING,
Case Western Reserve Univ., Cleveland, OH. Dept. of Systems Engineering.
For primary bibliographic entry see Field 6A.
W78-05484

THEORETICAL ESTIMATIONS OF FLOOD ROUTING PARAMETERS,
Northeastern Univ., Boston, MA. Dept. of Civil Engineers.
For primary bibliographic entry see Field 8B.
W78-05572

CHARACTERIZATION AND IMPACT OF STORMWATER RUNOFF FROM VARIOUS LAND COVER TYPES,
Wiggins-Rimer and Associates, Durham, NC.
For primary bibliographic entry see Field 5B.
W78-05580

DAM IN THE VILYUY HYDRAULIC POWER SYSTEM,
For primary bibliographic entry see Field 8D.
W78-05589

CALCULATION OF FLOOD DISCHARGES AND FLOOD HYDROGRAPHS IN KANSAS,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 2E.
W78-05592

FLOOD PLAIN INFORMATION: SALT CREEK, KICKAPOO CREEK, BRAINARD BRANCH, AND SALT SPRING BRANCH, LOGAN COUNTY, ILLINOIS.
Army Engineer District, Chicago, IL.
Prepared for Logan County Regional Planning Commission, May 1976, 38 p, 16 fig, 42 plates, 9 tab.

Descriptors: *Illinois, *Flood forecasting, *Flood data, *Stage-discharge relations, Floods, Flood flow, Flood profiles, Historic floods, Flood stages, Flood peak, Flood plains, Flood protection, Non-structural alternative, Land use, Planning, Control structures, Logan County(IL), *Salt Creek(IL), *Kickapoo Creek(IL), *Brainard Branch(IL), *Salt Spring Branch(IL), 100-year flood, 500-year flood.

The study area includes portions of Logan County, Illinois that are subject to flooding from Salt Creek, Kickapoo Creek, Brainard Branch and Salt Spring Branch. The flood plain is mostly agricultural of undeveloped, with some residential and commercial land uses. Flood data were obtained from topographic maps, field studies, historical sources and stream gage records. The main flood season occurs in April and May and results from heavy general rainfall. Winter flooding may occur when frozen ground prevents rainfall absorption. Culverts and bridges in the study area frequently obstruct flood flow. The worst flood recorded on Salt Creek t the Rocky Ford bridge occurred on May 19, 1943, cresting at 545.6 feet mean sea level (msl). At the same location, the 100-year flood would crest at 550.6 feet msl and would discharge 42,000 cubic feet per second (cfs), while the 500-year flood would crest at 553.3 feet msl and would discharge 61,000 cfs. Historic and future flood profiles are presented for the entire study area. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05663

FLOOD PLAIN INFORMATION: MUSKINGHAM DRAW, ODESSA, TEXAS.
Army Engineer District, Fort Worth, TX.
Prepared for City of Odessa, Texas, October 1977, 33 p, 9 fig, 17 plates, 6 tab.

Descriptors: *Texas, *Indirect flood measurement, *Streamflow forecasting, *Flood profiles, *Flood data, Floods, Flood stages, Peak discharge, Stage-discharge relations, Flood protection, Non-structural alternatives, Flood plain zoning, Warning systems, Land use, Planning, Zoning, Control structure, Floodproofing, Odessa(TX), *Muskingham Draw(TX), *Flood plain management, 100-year flood, 500-year flood.

The study area includes Muskingham Draw and its flood plain in the vicinity of Odessa, Texas. The flood plin in Odessa is extensively developed with residential and commercial land uses. This land use pattern is spreading into the sparsely developed rural limits of the study area. Flood data were obtained from topographic maps, field studies, historical sources, and hydrologic data from similar watersheds in the region. No stream gage records exist for the study area. The main flood season occurs in spring and early summer and results from heavy general rainfall. Intense local thundersotms may cause flooding at other times. Past floods are described but their magnitudes are not quantified. Maximum flood discharges for other streams in the region are presented. At the downstream study limit, the 100-year flood would discharge 3,100 cubic feet per second (cfs), while the 500-year flood would discharge 4,900 cfs. Guidelines for flood plain management are presented; structural and non-structural flood measures are described. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05664

FLOOD PLAIN INFORMATION: LITTLE KANAWHA RIVER, GLENVILLE, WEST VIRGINIA.
Army Engineer District, Huntington, WV.
Prepared for State of West Virginia, Division of Water Resources, January 1970, 39 p, 9 fig, 10 plates, 8 tab.

Descriptors: *West Virginia, *Flood flow, *Flood forecasting, *Flood data, Floods, Streamflow forecasting, Flood profiles, Storms, Historic floods, Peak discharge, Stage-discharge relations, Standard Project Flood, Flood plains, Flood protection, Non-structural alternatives, Warning systems, Land use, Planning, Control structures, *Little Kanawha River(WV), Glenville(WV), Intermediate Regional Flood.

The study area includes the Little Kanawha River and its flood plain in the vicinity of Glenville, West Virginia, covering a 3.3 mile stretch of the river. Developments in the flood plain consist of residential and commercial land uses in the urban area. Elsewhere, agricultural and recreation uses predominate. Flood data were obtained from topographic maps, field studies, historical sources, and stream gage records. The main flood season occurs in late winter and early spring, resulting from heavy general rainfall. Intense local thunderstorms may cuase flooding at other times. The worst flood recorded at Glenville occurred on March 7, 1967. It crested at 732.3 feet mean sea level (msl), and discharged 21,500 cubic feet per second (cfs). At the same location, the Intermediate Regional Flood (IRF) would crest at 732.7 feet msl and would discharge 23,500 cfs, while the Standard Project Flood (SPF) would crest at 747 feet msl and would discharge 75,000 cfs. Construction of the proposed Burnsville Lake Project approximately 20 miles upstream from Glenville would reduce the magnitude of the IRF and SPF. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05665

FLOOD PLAIN INFORMATION: APPOMATTOX RIVER, CHESTERFIELD COUNTY - PETERSBURG, VIRGINIA.
Army Engineer District, Norfolk, VA.
Prepared for Virginia State Water Control Board, March 1975, 33 p, 9 fig, 13 plates, 8 tab.

Descriptors: *Virginia, *Streamflow forecasting, *Flood profiles, *Flood data, *Stage-discharge relations, Floods, Flood flow, Indirect flood measurement, Storms, Historic floods, Flood stages, Peak discharge, Flood plains, Standard Project Flood, Flood protection, Non-structural alternatives, Warning systems, Land use, Planning, Control structures, Dikes, *Appomattox River(VA), Chesterfield County(VA), Petersburg(VA), Colonial Heights(VA), Intermediate Regional Flood.

The study area involves the Appomattox River and its flood plain in the vicinity of the cities of Colonial Heights and Petersburg, Virginia. Development on the flood plain varies from undeveloped to intensive commercial, residential, and industrial land uses. Flood data were obtained from topographic maps, field studies, historical sources, and stream gage records. The most serious flooding occurs from May through November and results from heavy rains associated with tropical disturbances. Flooding may occur at any time of year. The worst flood recorded near Petersburg occurred in October 1972. Its magnitude was equivalent to the Intermediate Regional Flood (IRF). It discharged 40,800 cubic feet per second (cfs) and crested at 18.4 feet mean sea level (msl). At the same location, the Standard Project Flood (SPF) would discharge 62,000 cfs and would crest at 24.3 feet msl. The IRF and SPF would cause substantial damage. A Corps of Engineers dike has provided flood protection to Petersburg, except for the floods of 1940 and 1972. In 1972, extensive damage was caused due to a break in the dike. An earth and concrete levee system was considered but was rejected as being uneconimical. This study is intended for use in making land use planning and

management decisions concerning flood plain utilization. (NessaeNC)
W78-05666

SPECIAL FLOOD HAZARD INFORMATION REPORT: SOUTH PLATTE RIVER, VOLUME 1, WELD COUNTY, COLORADO.
Army Engineer District, Omaha, NB.
Prepared for Weld County, Colorado, April 1977, 26 p, 35 plates, 9 tab.

Descriptors: *Colorado, *Flood flow, *Streamflow forecasting, *Flood profiles, *Flood data, Floods, Indirect flood measurement, Historic floods, Flood frequency, Flood recurrence interval, Flood stages, Flood peak, Stage-discharge relations, Flood plains, Flood protection, Non-structural alternatives, Land use, Planning, Weld County(CO), *South Platte River(CO), 100 year flood, 500 year flood.

The study area includes the South Platte River and its flood plain in Weld County, Colorado. A large proportion of the flood plain contains agricultural land uses. Dense development patterns exist in the proximity of larger incorporated areas. Flood data were obtained from topographic maps, field studies, historical sources and stream gage records. The main flood season occurs from May through August, and results from heavy general rainfall or intense local thunderstorms, either of which may be augmented by snowmelt. The worst flood recorded at the Kersey gage occurred on May 8, 1973. The flood discharged 31,500 cubic feet per second (cfs), and crested at 4586.3 feet mean sea level (msl). This flood is equivalent to the 100 year flood. At the same location, the 500 year flood would discharge 63,000 cfs and would crest at 4,588 feet msl. These floods would primarily affect public utilities, public roadways, and agricultural properties and associated developments. This study is intended for use in making land use planning and management decisions regarding flood plain utilization. (Nessa-NC)
W78-05667

FLOOD PLAIN INFORMATION: ALLEGHENY RIVER, MCKEAN COUNTY, PENNSYLVANIA.
Army Engineer District, Pittsburgh, PA.
Prepared for McKean County, PA, December 1976, 40 p, 11 plates, 7 tab.

Descriptors: *Pennsylvania, *Flood forecasting, *Flood profiles, *Flood data, *Peak discharge, *Stage-discharge relations, Floods, Flood flow, Indirect flood measurement, Streamflow forecasting, Storms, Historic floods, Flood stages, Flood protection, Non-structural alternatives, Warning systems, Land use, Planning, Control structures, Dikes, McKean County(PA), *Allegheny River(PA), Eldred(PA), Port Allegany(PA), Lillibridge Creek(PA), 100-year flood, 500-year flood.

The study area involves the portions of McKean County, Pennsylvania that are affected by flooding from the Allegheny River. The flood plain consists primarily of undeveloped or agricultural land uses, except in the urban areas of Eldred and Port Allegany where residential, commercial, industrial and transportation land uses predominate. Flood data were obtained from topographic maps, field studies, historical sources, and stream gage records. The main flood season occurs from December through April and results from heavy general rainfall combined wit snowmelt. Intense local thunderstorms may cause flooding at other times. An earth dike along the right bank of both the Allegheny River and Lillibridge Creek in Port Allegany affords some protection against moderately high floods but not against extremely high floods such as the one of June 1972. The worst flood recorded at Port Allegany occurred in July 1942, discharging 30,000 cubic feet per second (cfs). At the Eldred gage the worst recorded flood occurred on June 23, 1972, cresting 29.05 feet above flood stage and discharging 35,500 cfs. At the same location, the 100-year flood would crest 28.8 feet above flood stage and would discharge 35,000 cfs, while the 500-year flood would crest 32.9 feet above flood stage and would discharge 52,800 cfs. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W78-05668

4B. Groundwater Management

MULTIPLE-COMPLETION GEOTHERMAL ENERGY PRODUCTION SYSTEMS,
For primary bibliographic entry see Field 8C.
W78-05240

TECHNICAL REQUIREMENTS AND ANALYSIS METHODS FOR EVALUATING THE ENVIRONMENTAL CONSEQUENCES OF GROUNDWATER CONTAMINATION,
BCS., Inc., Richland, WA.
For primary bibliographic entry see Field 5B.
W78-05372

PILOT PLANT INVESTIGATION OF THE EVOLUTION OF VARIOUS POLLUTANTS DURING ARTIFICIAL RECHARGE OF AN AQUIFER BY A BASIN,
Societe Lyonnaise des Eaux et de l'Eclairage (France).
For primary bibliographic entry see Field 5B.
W78-05374

HYDROCHEMICAL EFFECTS OF WASTE PERCOLATION OF GROUNDWATER IN BASALT NEAR FOOTSCRAY, VICTORIA, AUSTRALIA,
Geological Survey of Victoria (Australia).
For primary bibliographic entry see Field 5B.
W78-05376

MODELLING OF LARGE MULTILAYERED AQUIFER SYSTEMS: THEORY AND APPLICATIONS,
Ecole National Superieure des Mines de Paris, Fontainebleau (France). Center for Geological Information.
For primary bibliographic entry see Field 2F.
W78-05384

DETERMINATION OF AQUIFER PARAMETERS BY A TWO-WELL PULSED METHOD USING RADIOACTIVE TRACERS,
UKAEA Hydrology and Coastal Sediment Group, Harwell (England).
For primary bibliographic entry see Field 2F.
W78-05385

DRAINAGE BY RECHARGE WELLS IN A LEAKY AQUIFER,
Indian Inst. of Tech., Kharagpur. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2F.
W78-05387

FLOW TOWARD A PARTIALLY PENETRATING WELL IN A BOUNDED ARTESIAN AQUIFER,
Indian Inst. of Tech., Madras (India). Hydraulic Engineering Lab.
For primary bibliographic entry see Field 2F.
W78-05388

NON-DARCY FLOW AND ITS IMPLICATIONS TO SEEPAGE PROBLEMS,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W78-05392

TRENDS OF SELECTED GROUND-WATER CONSTITUENTS FROM INFILTRATION GALLERIES, SOUTHEAST NASSAU COUNTY, NEW YORK,
Geological Survey, Mineola, NY. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-05420

AVAILABILITY OF GROUND WATER IN SEMINOLE COUNTY AND VICINITY, FLORIDA,
Geological Survey, Orlando, FL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05426

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 1. CENTRAL AND NORTHERN LOUISIANA.
Geological Survey, Baton Rouge, LA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05428

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 2. SOUTHERN LOUISIANA.
Geological Survey, Baton Rouge, LA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05429

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 3. COASTAL LOUISIANA,
Geological Survey, Baton Rouge, LA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05430

SUMMARY GROUND-WATER RESOURCES OF LANCASTER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, PA. Water Resources Div.
C. W. Poth.
Pennsylvania Geological Survey, Harrisburg, Fourth Series, Water Resources Report 43, 1977. 80 p, 5 fig, 1 plate, 7 tab, 26 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Hydrogeology, *Water yield, Water quality, *Pennsylvania, Well data, Water levels, Petrology, Drawdown, Groundwater recharge, Water analysis, Water wells, Surface-groundwater relationships, Lancaster County(Penn).

Lancaster County, Pennsylvania, lies in the Piedmont physiographic province. The northern 10 percent of the county is underlain by sandstone and shale, and intruded by a diabase. Water in these rocks is soft to moderately hard and median well yields are a little over 10 gpm (gallons per minute). The central half of the county is underlain dominantly by limstone and dolomite, and to a lesser extent by shale, quartzite, and phyllite. The water ranges from soft in the quartzite to very hard in some of the carbonate rocks. The best well yields are obtained in the carbonate rock unit; and one of them, the Ledger Formation, has a median specific capacity of 2.5 gpm per foot of drawdown. The southern part of the county is underlain by schist, part of which contains interbeds of quartzite. The water in these rocks is soft and the median yield from wells is about 10 gpm. (Woodward-USGS)
W78-05432

GROUND-WATER LEVELS IN THE UNITED STATES, 1974. SOUTHEASTERN STATES.
Geological Survey, Reston, VA. Water Resources Div.

For primary bibliographic entry see Field 2F.
W78-05433

GROUND-WATER LEVELS IN THE UNITED STATES, 1971-74. NORTHWESTERN STATES.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2F.
W78-05434

GROUND-WATER RESOURCES OF CAMBODIA,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2F.
W78-05435

EVALUATION OF A POTENTIAL WELL FIELD NEAR CHURCH ROCK AS A WATER SUPPLY FOR GALLUP, NEW MEXICO,
Geological Survey, Albuquerque, NM. Water Resources Div.
G. A. Hearne.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-274 713, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 77-98, September 1977. 21 p, 3 fig, 7 tab, 14 ref.

Descriptors: *Model studies, *Groundwater potential, *Aquifer characteristics, *Groundwater availability, *New Mexico, Mathematical models, Water supply, Projections, Computer models, Gallup(N Mex), San Juan Basin, Morrison Formation, Westwater Canyon Member.

A digital model is used to evaluate the Westwater Canyon Member of the Upper Jurassic Morrison Formation near Church Rock, N. Mex., as the source for a potential well field to supply water to Gallup, N. Mex. The estimated values of the aquifer parameters are transmissivity, 300 feet squared per day; coefficient of confined storage, 0.0002; coefficient of unconfined storage, 0.10; and leakance, 10 to the minus 7th power per day. The model indicated that the ability of the potential well field to meet the projected needs of the city of Gallup depends on the future withdrawals of water from uranium mines in the area. (Woodard-USGS)
W78-05436

RECONNAISSANCE OF GROUND-WATER RESOURCES IN THE MOUNTAIN HOME PLATEAU AREA, SOUTHWEST IDAHO,
Geological Survey, Boise, ID. Water Resources Div.
H. W. Young.
Water-Resources Investigations 77-108 (open-file report), December 1977. 40 p, 11 fig, 4 tab, 17 ref.

Descriptors: *Groundwater resources, *Surveys, *Water supply, *Irrigation, *Idaho, Hydrologic data, Aquifer characteristics, Water wells, Water yield, Water quality, Chemical analysis, Hydrogeology, Groundwater recharge, Groundwater availability, Evaluation, *Mountain Home plateau area(Idaho).

The Mountain Home plateau area occupies approximately 1,220 sq mi in southwestern Idaho. The plateau has long been recognized as a potential area for increased agricultural development. However, plans for increased development are limited by the availability of water. Potential sources of additional water for irrigation are importation of water from the Boise River drainage basin, diversion of Snake River water, and increased pumping from aquifers underlying the plateau. This report includes (1) descriptions of aquifer systems, (2) documentation of changes in groundwater storage caused by water-supply development, (3) mapping of the water-table and perched-water zones and determination of direction of ground-water flow, and (4) definition of ground-water recharge and discharge areas. Work accomplished during this 1-year investigation included an inventory of 260 wells and 14 springs; monthly water-level measurements at 27 wells; collection of water samples for chemical analyses from 37 wells and 10 springs; collection of water samples for isotopic analyses from 15 wells and springs; and collection of borehole geophysical logs from 5 wells. In addition, geologic and hydrologic data from previous studies were used. (Woodard-USGS)
W78-05438

STREAM SIMULATION IN AN ANALOG MODEL OF THE GROUND-WATER SYSTEM ON LONG ISLAND, NEW YORK,
Geological Survey, Mineola, NY. Water Resources Div.
For primary bibliographic entry see Field 2F.
W78-05440

APPLICATION OF THERMAL IMAGERY AND AERIAL PHOTOGRAPHY TO HYDROLOGIC STUDIES OF KARST TERRANE IN MISSOURI,
Geological Survey, Rolla, MO. Water Resources Div.; and Missouri Dept. of Natural Resources, Rolla. Div. of Geology and Land Survey.
For primary bibliographic entry see Field 5G.
W78-05441

GROUND WATER IN THE KOEHN LAKE AREA, KERN COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
J. H. Koehler.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-277 252, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 77-66, December 1977. 24 p, 8 fig, 2 ref.

Descriptors: *Groundwater resources, *Overdraft, *Hydrogeology, *Projections, *Saline water intrusion, *California, Aquifer characteristics, Pumping, Water supply, Water storage, Water demand, Drawdown, Groundwater recharge, Water quality, Water yield, Evaluation, Kern County(Calif), *Koehn Lake area(Calif).

Hydrologic characteristics of the koehn Lake area in Kern County, Calif., were investigated to determine the effects of external stresses on the system. Unconsolidated deposits are more than 900 feet thick in the central part of the basin. Cantil Valley fault, in the central part of the basin, acts as a barrier to the flow of ground water. Average annual recharge to aquifers from percolation of surface water and from underflow, between 1958 and 1976, was 10,200 acre-feet. Average annual consumptive use, between 1960 and 1976, was 32,000 acre-feet, 21,800 acre-feet more than the recharge, implying that average annual withdrawal from storage is about 22,000 acre-feet. Storage depletion in 1976 was 50,000 acre-feet, considerably higher than the average. The cumulative storage depletion has caused a decline in water levels and a pumping depression about 5 miles southwest of Koehn Lake. Ground water in storage in 1976 was about 4 million acre-feet, and ground water in storage above the 500-foot depth excluding the saline water under Koehn Lake was about 2 million acre-feet. Water samples were collected from 24 wells for chemical analysis. Comparison of analyses made during this study with historical water-quality analyses indicated no significant change. A recent reversal in ground-water gradient southwest of Koehn Lake may allow the saline water below Koehn Lake to invade the freshwater aquifer. (Woodard-USGS)
W78-05442

NATIONAL WATER SUPPLY AND IMPROVEMENT ASSOCIATION (NWSIA): WATER REUSE AND DESALINATION FOR THE FUTURE.
National Water Supply and Improvement Association, Ipswich, MA.
For primary bibliographic entry see Field 3A.
W78-05532

SITE SPECIFIC BURIAL OF UNFIXATED FLUE GAS SLUDGE,
Research-Cottrell, Inc., Bound Brook, NJ.
For primary bibliographic entry see Field 5E.
W78-05555

DISPERSIVE SOURCES IN UNIFORM GROUND-WATER FLOW,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-05571

SALT WATER INTRUSION IN THE UNITED STATES,
Robert S. Kerr Environmental Research Lab., Ada, OK.
For primary bibliographic entry see Field 5B.
W78-05613

4C. Effects On Water Of Man's Non-Water Activities

FORESTS AND WATER QUALITY,
Northeastern Forest Experiment Station, Durham, NH.
For primary bibliographic entry see Field 5B.
W78-05245

WHEN SKI TRAILS ARE CUT THROUGH FOREST LAND, WHAT HAPPENS TO STREAMFLOW,
Northeastern Forest Experiment Station, Durham, NH.
J. Hornbeck, and G. Stuart.
Ski Area Management 15(4), p 34-36, 47, 1976. 3 fig.

Descriptors: Streamflow, *Forests, *Sedimentation, *Temperature, Water quality, Nutrients, Snowmelt, New Hampshire, Clear-cutting, Hubbard Brook Experimental Forest(NH), *Ski trails, *Forest cutting(Trails).

Based on gaged watershed studies, converting of forests to ski trails in New England will increase total summer streamflow by an estimated one to two inches. The increase will be greatest immediately after clearing the trails and will gradually disappear in three to four years as a healthy new cover of grasses and herbaceous plants becomes established. Common sense practices can minimize the problems of sedimentation and leaching of chemical ions to streams. (Forest Service)
W78-05249

ECOSYSTEM IMPACTS OF URBANIZATION ASSESSMENT METHODOLOGY.
Corvallis Environmental Research Lab., OH.
For primary bibliographic entry see Field 6G.
W78-05533

HIGHWAYS IN THE RIVER ENVIRONMENT--HYDRAULIC AND ENVIRONMENTAL DESIGN CONSIDERATIONS, BASIC COURSE, INSTRUCTOR'S LESSON PLANS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-05585

EVALUATION OF FLOOD RISK FACTORS IN THE DESIGN OF HIGHWAY STREAM CROSSINGS. VOL III. FINITE ELEMENT MODEL FOR BRIDGE BACKWATER COMPUTATION,
Water Resources Engineers, Springfield, VA.
For primary bibliographic entry see Field 8B.
W78-05596

4D. Watershed Protection

FORESTS AND WATER QUALITY,
Northeastern Forest Experiment Station, Durham, NH.
For primary bibliographic entry see Field 5B.
W78-05245

WATER-HOLDING CAPACITY FOR HYDROMULCH,
California State Dept. of Transportation, Sacramento. Transportation Lab.
T. P. Hoover.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 646, Price codes: A02 in paper copy, A01 in microfiche. Final Report No. CA-DOT-TL-2167-1-76-36, June 1976. 17 p, 9 append.

Descriptors: *Laboratory tests, *Mulching, *Erosion control, *Moisture content, Drying, Sampling, Statistics, Mathematical studies, *Hydromulch, *Water-holding capacity, Fibers, Ground cover, Seeding.

A proposed test procedure to evaluate the water-holding capacities of various hydromulch fibers was presented. This procedure is a refinement of a preliminary procedure based on methods used by three producers or testers of hydromulch fibers. The testing program used to determine the significant steps and the most reliable procedure was given. (Adams-ISWS)
W78-05363

DEVELOPMENT OF PROCEDURES FOR COST-SHARING AND REPAYMENT ANALYSIS,
New York State Coll. of Agriculture and Life Sciences, Ithaca.
For primary bibliographic entry see Field 6B.
W78-05485

ONSITE CONTROL OF SEDIMENTATION UTILIZING THE MODIFIED BLOCK-CUT METHOD OF SURFACE MINING.
Kentucky Dept. of Natural Resources and Environmental Protection, Frankfort.
For primary bibliographic entry see Field 5G.
W78-05536

ADSORPTION LOSSES AND PERFORMANCE OF 51CR-EDTA AND 198AU IN TRACING OF FLOOD RUNOFF,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-05573

A MULTIDIMENSIONAL ANALYSIS OF THE RESULTS OF THE FRENCH 1971 SURFACE WATER QUALITY NETWORK CONTROL IN THE RIVER BASIN 'SEINE-NORMANDIE',
Ecole Nationale Superieure des Mines de Paris, Fontainebleau (France). Center for Geological Information.
For primary bibliographic entry see Field 5A.
W78-05581

EXPERIMENTAL INVESTIGATION OF WATERSHED SURFACE RUNOFF A CONTRIBUTION TO THE INTERNATIONAL HYDROLOGICAL DECADE,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W78-05587

CALCULATION OF FLOOD DISCHARGES AND FLOOD HYDROGRAPHS IN KANSAS,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 2E.
W78-05592

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

MNO2 DEPOSITION IN FEEDLOT WATER LINES IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Chemistry.
H. Gehrke.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 809, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, Report for Phase I and Phase II, January 1978. 31 p, 6 tab. OWRT A-048-SDAK(1) and A-058-SDAK(1), 14-31-0001-5042, 14-34-0001-7087.

Descriptors: Hyphomicrobium, Manganese oxidation, Manganese oxides, *Manganese oxide deposits, *South Dakota, Farm wastes, Feed lots, Oxides, Chemical analysis, Water analysis, Pollutant identification, Water pollution sources, Distribution systems, Pipelines, Oxalic acid, Sulfuric acid, Chemical degradation.

The objectives were to determine the causes for the deposition of MnO2 in water lines in eastern South Dakota and to determine methods to clean buried water lines containing MnO2. Chemical analysis of water at a number ... sites suggests that factors such as total hardness and Mn to the 2+ power, HCO3 to the 1- power, SO4 to the 2- power and dissolved oxygen concentrations may be related to the increased deposition of MnO2 in affected systems. Microorganisms have been implicated in at least some of the systems with the identification of Hyphomicrobium. Analysis of all factors suggests that MnO2 deposition is a combination of physico chemical and biological phenomena. MnO2 deposits have been found in plastic, iron and copper water lines; no logical pattern relating MnO2 to a specific type of pipe or to the chemical constituents of the water has been elucidated. Using water from the farm where Hyphomicrobium was isolated, a method was developed to continuously remove Mn to the 2+ power from the water. Thus a laboratory model for the MnO2 deposition has been attained and work can proceed in an attempt to alleviate the problem. Copper has shown promise in preventing MnO2 deposition. Laboratory tests indicate that a combination of oxalic acid and sulfuric acid was most effective at dissolving MnO2 deposits in a reasonable length of time. Laboratory simulation of a clogged water line indicates that much of the cleaning action is mechanical rather than chemical. (Wiersma-So Dak St)
W78-05202

STUDY ON THE STATE OF WATER IN DISPERSIONS OF H+, MG2+ AND FE3+ MONTMORILLONITES BY HIGH-RESOLUTION NMR, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics; and Moscow State Univ. (USSR). Dept. of Soil Melioration.
For primary bibliographic entry see Field 2K.
W78-05238

PROCEEDINGS OF THE CONFERENCE ON ASSESSING THE EFFECTS OF POWER-PLANT-INDUCED MORTALITY ON FISH POPULATIONS.
Energy Research and Development Administration, Oak Ridge, TN.; and Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 5C.
W78-05251

FACTORS TO CONSIDER IN MONITORING PROGRAMS SUGGESTED BY STATISTICAL ANALYSIS OF AVAILABLE DATA,
Battelle Pacific Northwest Labs., Richland, WA.
For primary bibliographic entry see Field 5C.
W78-05263

HIGH PERFORMANCE LIQUID CHROMATOGRAPHIC DETERMINATION OF UNREACTED ACRYLAMIDE EMULSION OR AQUEOUS HOMOPOLYMERS OR EMULSION COPOLYMERS,
Petrolite Corp., St. Louis, MO. Tretolite Div.
F. J. Ludwig, Jr., and M. F. Besand.
Analytical Chemistry, Vol. 50, No. 1, p 185-187, January, 1978. 1 fig, 4 tab, 6 ref.

Descriptors: *Chemical precipitation, *Aqueous solutions, *Anions, *Cations, *Chromatography, Industrial wastes, Waste water treatment, Water pollution sources, Emulsions, Oil industry, *Pollutant identification, Analytical techniques, Flocculation, Separation techniques.

Unreacted amounts of acrylamide, a toxic residual of waste water treatment and oil-field waterfloods, were measured by precipitation in acetone and methanol solutions. The rates within one hour of acrylamide solution polymerization or emulsion copolymerization were measured. The mean percentage of acrylamide in an anionic emulsion after addition to acetone was 0.41% after a 10-min stirring. The percentage did not significantly change for stirring times of 30 and 60 min. A cationic copolymer emulsion yielded a mean residual acrylamide percentage of 0.061% after addition of acrylamide to acetone. Again, there was no significant change in recovery for the three stirring times after the initial 10 minutes. The percentage of acrylamide recovered from spiked cationic emulsion copolymers was higher using acetone-precipitation; recovery rates from anionic emulsion copolymers were greater using methanol-precipitation. It was concluded that solvent extraction with acetone was better suited to cationic emulsion copolymers and aqueous polyacrylamides. Methanol-precipitation was considered more applicable to the recovery of residual acrylamide in anionic emulsion copolymers. (Lisk-FIRL)
W78-05270

MONITORING CONTINUOUSLY THE OXYGEN DEMAND OF INDUSTRIAL EFFLUENT AND SURFACE WATERS,
Philips Gloeilampenfabrieken N.B., Eindhoven (Netherlands). Application Lab.
G. Voorn, and J. Lee-Frampton.
Water and Waste Treatment, Vol 20, No 10, p 14-18, October, 1977. 10 fig, 1 tab, 7 ref.

Descriptors: *Dissolved oxygen analyzers, Equipment, *Monitoring, *Analytical techniques, *Industrial wastes, Water pollution control, Dissolved oxygen, Organic wastes, Food processing industry, Chemical oxygen demand, Waste water treatment.

Use of the Philips TOD meter is presented as an efficient method of continuously monitoring dissolved oxygen levels in industrial effluent and surface waters. Electro-chemical relationships utilized by the Philips meter include the Faraday Law and the Nernst Law. Monitoring of total dissolved oxygen is considered as an alternative to the COD method for assessing the organic load in a water

sample. Effluents from the meat preservation, pharmaceutical, and chemical industries were used to derive an equation relating the COD with the total dissolved oxygen content as measured by the Philips meter. This method is also applied to surface water samples obtained from the Naviglio Vecchio Canal near Milan, Italy. (Baker-FIRL)
W78-05298

QUALITATIVE AND QUANTITATIVE DETERMINATION CHLORINATED ORGANIC COMPOUNDS IN WASTE WATERS FROM BLEACHING WORKS BY GAS CHROMATOGRAPHY AND MASS SPECTROSCOPY (QUALITATIVE AND QUANTITATIVE BESTIMMUNG VON CHLORIERTEN ORGANISCHEN VERBINDUND IN BLEICHEREIABWAESSERM MITTELS GASCHROMATOGRAPHIE UND MASSENSPEKTROSKOPIE),
Swedish Forest Products Research Lab., Stockholm.
K. Lindstroem.
Das Papier, Vol 31, No 12, p 517-525, 1977. 15 fig.

Descriptors: Analytical techniques, *Chlorination, Pulp and paper industry, *Bleaching wastes, *Gas chromatography, *Pollutant identification, *Spectroscopy, Organic compounds, Solvent extraction, Laboratory tests, Phenols, Bioassay, Pulp wastes, Fish, Toxicity.

Qualitative and quantitiative analyses of the chlorinated organic compounds formed as a result of the oxidation of lignin during pulp bleaching are described. The lipophilic fractions were extracted for 48 hrs with diethylether and a continuous extraction apparatus. The phenols were extracted from the ether solution with NaOH and acidified. They ethylation with fresh diazoethene, the resulting phenol-ehters were analyzed by gas chromatography-mass spectroscopy. The toxicities and lethal limits of these compounds on fish were evaluated in experiments in which dilute bleaching plant waste water was continuously passed through aquaria. Analyses established that the chlorinated phenols were concentrated in the fish muscles and liver. These compounds were eliminated fairly quickly after the fish were returned to fresh water. Tetrachlorguaiacol was retained for the longest period after return to fresh water. (Tallert-FIRL)
W78-05320

ON-LINE INDUSTRIAL WATER POLLUTION MONITORS,
J. W. Javetski.
Power, Vol. 122, No. 1, p 29-36, January, 1978. 18 fig, 3 tab.

Descriptors: *Electrodes, *Colorimetry, *Photometry, *Pollutant identification, *Monitoring, Analytical techniques, Impaired water quality, Oil pollution, Pollutant, Effluents, Biochemical oxygen demand, Industrial wastes, Waste water treatment.

The National Pollutant Discharge Elimination System (NPDES) permit issued to each point-source polluter establishes limits for each pollutant likely to be discharged from the source, frequently including BOD, total suspended solids, and pH. To industrial environmentalists, some standard procedures appear too costly and time consuming for effluent monitoring. Ideally, both laboratory analysis and continuous on-line monitoring should be included in a pollution control program. Ion-selective electrodes (ISE) can include liquid-membrane-sensing, solid-state, and glass types. Ion-selective electrodes require: relatively constant sample temperature, interference, and sample flow; proper calibration and maintenance; and a sample ionic strength that does not vary by more than 30%. Combination systems for measuring more than one parameter of the effluent are available. In wet-chemical analyzers, a sample stream is reacted to produce a colored chemical species. The intensity of the color is measured colorimetrically to indicate the concentration of the chemical species as an indication of the degree of pollution. Photometric analyzers are based on the compound being monitored by ultraviolet absorption, molecular fluorescence, or infrared reflectance. (Snyder-FIRL)
W78-05332

ADSORPTION STUDIES USING GAS-LIQUID CHROMATOGRAPHY--II. COMPETITIVE ADSORPTION,
Birmingham Univ. (England). Dept. of Civil Engineering.
R. J. Martin, and K. S. Al-Bahrani.
Water Research, Vol. 11, No. 11, p 991-999, 1977. 19 fig, 2 tab, 8 ref.

Descriptors: *Activated carbon, *Organic compounds, *Adsorption, *Chromatography, Analytical techniques, Testing procedures, Waste water treatment, Water pollution, Industrial wastes, *Pollutant identification, *Gas chromatography.

Selective and competitive adsorption of low molecular weight, aromatic organic compounds onto activated carbon were detected with gas-liquid chromatography. The organic compounds analyzed in batch and column flow systems were: pyridine, 2-methyl-pyridine, o-cresol, 2-chlorophenol, nitrobenzene, o-methoxyphenol, and quinaldine. The adsorption capacity of activated carbon for each organic compound was compared to the competitive adsorption rates of multiple organic compound solutions. Adsorption rates for single solutes were adversely affected by the presence of other compounds in a multi-solute solution. Increased overall uptake rates for multi-compound solutions were attributed to the increased concentrations. Desorption of some compounds occurred in the column system when more effectively adsorbed compounds were introduced. Activated carbon's capacity for adsorption was not significantly affected by an increase in the number of compounds in solution during the batch system tests. Carbon capacity increased in column flow systems when solutes were increased. (Lisk-FIRL)
W78-05339

PESTICIDES IN IOWA SURFACE WATERS: SUMMARY OF A WORKSHOP HELD MARCH 1977.
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 5B.
W78-05349

NON-POINT SOURCES OF WATER POLLUTION.
Oregon State Univ., Corvallis. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W78-05352

BIOGEOCHEMISTRY OF DEEP LAKES IN THE CENTRAL ALASKAN RANGE,
Alaska Univ., College. Inst. of Water Resources.
J. LaPerriere, and L. Casper.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 031, Price codes: A03 in paper copy, A01 in microfiche. Report No. IWR-68, February, 1976. 35 p, 14 fig, 1 tab, 17 ref. OWRT A-041-ALAS(1).

Descriptors: *Lake morphology, *Lake morphometry, *Lake basins, *Alaska, *Limnology, Primary productivity, Aquatic algae, Plankton chlorophyll, Pigments, Aquatic plants, Zooplankton, Nutrients, Dissolved oxygen, Water temperature, Temperature, Heat budget, Geothermal studies, Thermocline, Climatic data, Ice cover, Iced lakes, Light penetration, Analytical techniques, Biochemistry, *Wonder Lake(Alas), *Paxson Lake(Alas), Plant nutrients, Oxygen saturation, Phaeopigments, Vascular plants, Biogeochemistry.

Biogeochemical data of Wonder and Paxson Lakes were collected and analyzed. Data collected include: climatic conditions, basin morphology, algal primary productivity, alkalinity, light penetration, algal chlorophyll and phaeopigment content, vascular plant colonization and dry weights, plant nutrient (nitrate, nitrite, phosphorus) concentrations, zooplankton colonization and dry weights, dissolved oxygen, pH, and electrical conductivity. Data are presented in location and morphometric maps, hypsometric graphs, temperature profiles, dissolved oxygen profiles, oxygen saturation profiles, light penetration diagram, algal growth parameters (carbon fixed and chlorophyll a), selected plant nutrient concentration profiles. Vascular plant productivity is estimated and zooplankton species are identified. Summer heat budgets are calculated. Differences in data for the two lakes are discussed and interpreted; analytical and data collection techniques are outlined. (Seip-IPA)
W78-05358

ABATEMENT OF MALODORS AT CONFINED DREDGED MATERIAL DISPOSAL SITES,
Argonne National Lab., IL.; and Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
W. Harrison, A. Dravnieks, R. Zussman, and R. Goltz.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A030 597, Price codes: A08 in paper copy, A01 in microfiche. Contract Report D-76-9, August 1976. 145 p, 23 fig, 38 tab, 47 ref, 2 append. WESRF 75-104.

Descriptors: *Waste, *Dredging, Disposal, *Odor, Research and development, Environmental engineering, Air pollution, Air, Wastes, Gases, Volatility, *Pollutant identification, *Malodors, *Odor control, Confined dredged material, Disposal sites, Containment area operations, Research program, Environmental research, Dredged material disposal.

Samples of malodorous air and dredged material were collected during the period July-October 1975 at confined disposal sites at the following locations: Buffalo, New York; Milwaukee, Wisconsin; Mobile, Alabama; York Harbor, Maine; Houston, Texas; Detroit, Michigan; and Anacortes, Washington. Odorous compounds in the air samples were identified by gas chromatography/mass spectrometry. The detection threshold, intensity, and character of the various odors were determined by experienced odor panelists using Tedlar-bag collectors. Samples were collected in 18-l capacity bags and were placed in aluminum drums equipped with flanges and 0.75-in-thick Plexiglass end plates. Samples were evaluated within 24 hours after sampling. Previous work had shown that odors do not deteriorate significantly in storage of this duration. (Roberts-ISWS)
W78-05360

ANNUAL REPORT ON THE DEVELOPMENT OF SENSORS AND TECHNIQUES FOR IN SITU WATER QUALITY MONITORING,
Pittsburgh Univ., PA. Dept. of Petroleum Engineering.
C. C. Liu.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-26717, Price codes: A03 in paper copy, A01 in microfiche. Annual Report No. N76-26717, June 12, 1976. 40 p, 16 fig, 5 ref. NASA NSG-3002.

Descriptors: *Monitoring, *On-site tests, *Chemical analysis, *Instrumentation, *Water chemistry, *Analytical techniques, *Pollutant identification, Analysis, Chemistry, Testing procedures, Data collections, Water quality, Trace elements, Chemical properties, Phenols, Electrodes, Water analysis, *Water quality sensors, *Monitoring techniques, In situ instrumental analysis, Chloride ion electrode, Ammonium ion electrode.

A progress report described the experimental work underway on the development of sensors and techniques for in situ monitoring of chloride, nitrite, phenol, ammonium, and adolesine triphosphate (ATP) in water supplies. For practical reasoning, chloride ion electrode and phenol electrode are attractive. (Henley-ISWS)
W78-05362

BIOLOGICAL ASSESSMENT OF THE SOLUBLE FRACTION OF THE STANDARD ELUTRIATE TEST,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
P. J. Shuba, J. H. Carroll, and K. L. Wong.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A040 087, Price codes: A06 in paper copy, A01 in microfiche. Technical Report D-77-3, March 1977. 109 p, 35 fig, 14 tab, 32 ref, 3 append.

Descriptors: *Dredging, *Bioassay, *Water pollution, *Sediments, *Testing procedures, Desilting, Analytical techniques, Biology, Channel improvement, Water analysis, Water pollution sources, Chemical analysis, *Bioindicators, *Pollutant identification, Algae, Disposal.

Selected species of algae, bacteria, and protozoans were used as test organisms. Marine and freshwater species of each group were tested. Sediment samples were collected from 4 locations that are dredged periodically, and water samples were collected from their corresponding disposal sites. Sediment locations were Bridgeport Harbor, Bridgeport, Connecticut; Ashtabula River, Ashtabula, Ohio; Galveston Harbor, Galveston, Texas; and Arlington Channel of Mobile Bay, Mobile, Alabama. The corresponding disposal sites were Eatons Neck, Long Island Sound, New York; Lake Erie, near Ashtabula, Ohio; Gulf of Mexico, near Galveston, Texas; and an open water disposal site adjacent to Arlington Channel in Mobile Bay, Alabama. The results of algal bioassays indicated both stimulatory and inhibitory effects when growth in the elutriate was compared to growth in disposal site water. All sediments used to prepare standard elutriates released large quantities of ammonium-nitrogen. Growth studies were conducted using the marine alga Dunaliella tertiolecta exposed to the concentrates of ammonia found in the elutriates. The concentrations used were not toxic to the test organisms. The results were discussed in relation to water quality. Algal bioassays are one method of assisting the evaluation of the suitability of a particular dredged material for disposal. Bacteria and protozoans are important in the cycling of nutrients and toxicants, but they are not recommended as test organisms for water column effects. Additional research was suggested, particularly the development of bioassays using benthic organisms. (Henley-ISWS)
W78-05366

SEDIMENT STUDIES IN BACK RIVER ESTUARY, BALTIMORE, MARYLAND.
National Enforcement Investigations Center, Denver, CO.
For primary bibliographic entry see Field 5B.
W78-05369

HYDROCHEMICAL EFFECTS OF WASTE PERCOLATION OF GROUNDWATER IN BASALT NEAR FOOTSCRAY, VICTORIA, AUSTRALIA,
Geological Survey of Victoria (Australia).
For primary bibliographic entry see Field 5B.
W78-05376

MICROPROBE ANALYSIS OF PROJECT DUSTORM HAILSTONE SAMPLES,
National Center for Atmospheric Research, Boulder, CO.
For primary bibliographic entry see Field 2K.
W78-05381

TRENDS OF SELECTED GROUND-WATER CONSTITUENTS FROM INFILTRATION GALLERIES, SOUTHEAST NASSAU COUNTY, NEW YORK,
Geological Survey, Mineola, NY. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-05420

AUTOMATED ATOMIC ABSORPTION SPECTROMETRIC DETERMINATION OF TOTAL ARSENIC IN WATER AND STREAMBED MATERIALS,
Geological Survey, Denver, CO. Water Resources Div.
M. Fishman, and R. Spencer.
Analytical Chemistry, Vol 49, p 1599-1602, September 1977. 2 fig, 6 tab, 8 ref.

Descriptors: *Pollutant identification, *Arsenic compounds, *Water analysis, *Sediments, *Chemical analysis, *Analytical techniques, Trace elements, Organic compounds, Inorganic compounds, Laboratory tests, Spectrometers, Methodology, *Atomic absorption spectrometer, *Arsenic.

An automated method to determine both inorganic and organic forms of arsenic in water, water-suspended mixtures, and streambed materials is described. Organic arsenic containing compounds are decomposed by either ultraviolet radiation or by sulfuric acid-potassium persulfate digestion. The arsenic liberated, with inorganic arsenic originally present, is reduced to arsine with sodium borohydride. The arsine is stripped from the solution with the aid of nitrogen and is then decomposed in a tube furnace heated to 800 deg C which is placed in the optical path of an atomic absorption spectrometer. Thirty samples per hour can be analyzed to levels of 1 microgram arsenic per liter. (Woodard-USGS)
W78-05421

DRAINAGE AREAS FOR JEFFERSON COUNTY, ALABAMA,
Geological Survey, Montgomery, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05427

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 1. CENTRAL AND NORTHERN LOUISIANA.
Geological Survey, Baton Rouge, LA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05428

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 2. SOUTHERN LOUISIANA.
Geological Survey, Baton Rouge, LA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05429

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 3. COASTAL LOUISIANA,
Geological Survey, Baton Rouge, LA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-05430

AN ANALYSIS OF SALINITY IN STREAMS OF THE GREEN RIVER BASIN, WYOMING,
Geological Survey, Cheyenne, WY. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-05439

THE USE OF 14C-LABELED PROTEIN HYDROLYSATE FOR DETERMINATION OF THE BACTERIAL DEVELOPMENT LIMIT IN NATURAL WATER DILUTIONS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. Biologii Vnutrennykh Vod.
V. I. Romanenko, N. A. Lapteva, and A. S. Daukshta.
Gidrobiol Zh 12(5), p 81-83, 1976.

Descriptors: Waste dilution, *Bacteria, *Carbon-14 method, Protein hydrolysate, Water pollution, *Pollutant identification, Methodology.

A simpler method of counting bacteria was devised based on the titers in a 10-fold dilution of the test sample in natural sterile water. After incubation and before the experiment, a drop of 14C-labeled protein hydrolysate was added to the test tube. The boundary of bacterial development was then found by its radioactivity with high sensitivity and shortened analysis time. The results corresponded well to the results of direct bacterial counts after growth in bacteria-free water under the same conditions.--Copyright 1977, Biological Abstracts, Inc.
W78-05447

DETERMINATION OF RESINOUS SUBSTANCES IN EFFLUENTS FROM THE PRODUCTION OF WOOD ROSIN (OPREDELENIE SMOLISTYKH VESHCHESTV V STOKAKH KANIFOL'NO-EKSTRAKTSIONNOGO PROIZVODSTVA),
Tsentralnyi Nauchno-Issledovatelskii i Proektnyi Inst. Lesokhimicheskoi Promyshlennosti, Khimki (USSR).
G. A. Ishcherikova.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 5, p 6-7, 1977. 1 ref, 1 tab.

Descriptors: *Pollutant identification, *Resins, Wastes, Industrial wastes, Effluents, Chemical industry, Gravimetric analysis, Analytical techniques, Water pollution sources, Pollutants, Distillation, Chemical analysis, Water analysis, *Rosin, Terpin hydrate, Wood extraction, Terpineol.

In the gravimetric determination of resinous substances in effluents from wood rosin extraction, the results obtained are usually too high, because of the presence of terpin hydrate (TH) which interferes with the analysis. A modified method was developed, in which TH is removed from the effluent prior to its gravimetric analysis. Acidification of the sample converts the TH to terpineol, and the latter is removed by distillation. (Stapinski-IPC)
W78-05450

PROPERTIES OF LIGNOSULFONATES FROM SPENT LIQUORS, WASH WATERS, AND BLEACHING EFFLUENTS FROM SULFITE PULP MANUFACTURE (EINIGE EIGENSCHAFTEN VON LIGNISULFONATEN AUS ABLAUGEN, WASCHWAESSERN UND

BLEICHEREIAWAESSERN DER SULFITZELLSTOFFHERSTELLUNG),
Technische Hochschule, Darmstadt (West Germany). Inst. fuer Makromolekulare Chemie.
M. Gahin, and T. Krause.
Holzforschung, Vol. 31, No. 5, p 144-147, October, 1977. 7 fig, 6 ref, 2 tab, English Summary.

Descriptors: *Sulfite liquors, *Bleaching wastes, *Pulp wastes, *Pollutants, *Lignins, *Sulfonates, Wastes, Industrial wastes, Water pollution sources, Effluents, Pulp and paper industry, Chromatography, Organic compounds, Properties, Sulfur, Physical properties, Chemical properties, Wash water, Spruce trees(Abies), Beech trees(Fagus), Spent sulfite liquor, Molecular weight, Wash water, Sulfite pulp.

Lignosulfonates (LS) were isolated from spent liquors, wash waters, and bleaching effluents involved in the manufacture of sulfite pulp from beech and spruce. Their degree of sulfonation was determined via analysis of the sulfur content, their molecular weight distribution via gel permeation chromatography. The degree of sulfonation of wash-water LS was found to lie clearly below that of spent sulfite liquor LS and to be very uniform (differences probably due to differences in intensity of washing rather than differences in intensity of cooking). Much lower still was the degree of sulfonation of bleaching effluent LS. The gel-chromatographically determined molecular weight distribution was generally the same for all the LS samples studied, with one maximum in the high-molecular range and another in the low-molecular range. Differences in this distribution can be attributed to pulping conditions, wood species, and point of LS sampling. Since the extinction coefficients of the LS samples exhibited considerably different values in some cases, direct quantitative comparison of distribution curves was often not possible. (Speckhard-IPC)
W78-05454

RECIPIENT WATER AS SEEDING MATERIAL FOR DETERMINATION OF 7-DAY BOD IN PULP AND PAPER MILL EFFLUENT (LUONNONYMPPIEN KAYTTO METSATEOLLISUUDEN JATEVESIEN BOD(7)-MAARITYKSESSA),
Pulp and Paper Research Inst., Helsinki (Finland).
O. Seppovaara, and B. Starck.
Kemia-Kemi, Vol. 4, No. 5, p 193-195, 1977. 4 fig, 5 ref, 3 tab, English summary.

Descriptors: *Effluents, *Pulp wastes, *Biochemical oxygen demand, *Water analysis, Wastes, Industrial wastes, Water pollution sources, Pulp and paper industry, Microorganisms, Toxicity, Seasonal, Water properties, Water chemistry, Testing, Pollutant identification.

BOD determinations on pulp and paper effluents were examined with regard to the influence of seeding-material origin (seeding material from recipient water below the point of discharge or from the effluent of a municipal biological wastewater treatment plant). Also studied were the effect on BOD determination of variations in recipient-water seeding material with regard to physical-chemical characteristics, content of degrading organisms, and toxicity. Seasonal variations in seeding material were examined. A glucose-glutamine solution was used as control. The control solution demonstrated the equivalence of the recipient-water seeds. The effectiveness of a seed was not influenced by physical-chemical characteristics or content of degrading organisms. Seasonal variations were not significant. No detrimental effects were observed as the result of the presence of toxic substances. The studies indicate that recipient-water seeding material can be used in determining the BOD of pulp and paper mill effluents. In order to avoid possible toxic effects, it is recommended that the seed be taken 0.5-1 km below the point of discharge. (Speckhard-IPC)
W78-05456

CHROMATOGRAPHIC METHOD FOR ANALYSIS OF VANILLIN IN SULFITE MILL EFFLUENTS (CHROMATOGRAFICZNA METODA WANILINOWA ANALIZY CIECZY POPRODUKCYJNYCH Z CELULOZOWNI SIARCZYNOWYCH).
B. Pszonka.
Przeglad Papierniczy, Vol. 33, No. 7, p 245-250, July 1977. 4 fig, 27 ref, 8 tab. English summary.

Descriptors: *Pulp wastes, *Lignins, *Sulfite liquors, *Gas chromatography, *Pollutant identification, Bleaching wastes, Wastes, Industrial wastes, Water pollution sources, Colorimetry, Analytical techniques, Chemical analysis, Pulp and paper industry, Effluents, Water analysis, *Vanillin, *Lignosulfonates, Spent sulfite liquor, Sulfite pulp mills.

Hrutfiord's method of gas chromatographic determination of vanillin for the evaluation of the content of lignosulfonate in solutions was adapted to the analysis of sulfite mill effluents, viz., the overall mill effluent, bleach plant effluents, and digester room effluents (including pulp washing and screening). The calibration curve was obtained using the residual liquor from spent sulfite liquor fermentation from the same mill. A detailed description is given of the procedure, including the gas-liquid chromatography of vanillin solution in chloroform, extraction of vanillin, and hydrolysis of lignosulfonic acids. The results are compared with those obtained by the presently used Folin-Denis colorimetric method. The colorimetric method gave lignosulfonic acid contents 16-18% higher in the case of digester room and general effluent, and over 100% higher in the case of bleach plant effluent. This appears to confirm that during the bleaching process substances are formed affecting the results of analysis. Evidently, the colorimetric method is not specific for sulfonated lignin. In contrast, the vanillin method is specific for lignosulfonic acids, making possible their selective determination in the presence of other lignin compounds. The vanillin method also solves the problem of the standards for the preparation of calibration curves. (Stapinski-IPC)
W78-05460

CHEMICAL IDENTIFICATION OF CONSTITUENTS IN A TOXIC HARDBOARD PLANT EFFLUENT.
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
I. H. Rogers, H. W. Mahood, J. A. Servizi, and R. W. Gordon.
In: Canadian Pulp and Paper Association, Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), p 1-4 4 fig, 10 ref, 2 tab.

Descriptors: *Pulp wastes, *Toxicity, *Pollutant identification, Resins, Wastes, Industrial wastes, Water pollution sources, Douglas fir trees, Effluents, Gas chromatography, Mass spectrometry, Aromatic compounds, Fish, Sockeye salmon, Salmon, Aquatic animals, Acids, Water pollution effects, *Hardboard mills, Wood extractives, Resin acids.

Chemical fractionation of effluent from a hardboard mill (Pulping mainly douglas-fir) was used to locate the sources of toxicity to young sockeye salmon (Oncorhynchus nerka). Analysis of the two most toxic fractions (viz., those containing neutral compounds and resin acids) by gas chromatography/mass spectrometry resulted in the identification of 14 neutral compounds, 9 resin acids, and 9 other acids (including aromatic acids and compounds with insect juvenile hormone activity). Many of these compounds are unique to wood extractives of Douglas-fir. (Swichtenberg-IPC)
W78-05464

DYNAMICS OF MANGANESE, CADMIUM AND LEAD IN EXPERIMENTAL POWER PLANT PONDS,
Bradley Univ., Peoria, IL.. Dept. of Chemistry; and Bradley Univ., Peoria, IL. Dept. of Biology.
B. J. Mathis, T. F. Cummings, M. Gower, M. Taylor, and C. King.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 032, Price codes: A04 in paper copy, A01 in microfiche. University of Illinois, Urbana, Water Resources Center, Research Report No. 125 June 1977. 62 p, 36 fig, 10 tab, 3 ref, append. S-055-Ill.

Descriptors: Water pollution sources, Heavy metals, Biota, *Manganese, *Cadmium, *Lead, Benthos, Aquatic environment, Limnology, Food chain, Lentic environment, Illinois, Spectrophotometry, *Powerplant ponds, *Illinois River(Ill), Atomic Absorption Spectrophotometry, Pollutant identification, Cooling water, *Thermal pollution, Water pollution effects.

This study was designed to determine the effect of heated power plant cooling water on the compartmentalization of manganese, lead and cadmium in experimental ponds. Caged channel catfish and green sunfish were kept in an experimental pond and a control pond. Periodically, whole fishes, gill, heart, kidney, liver and musculature were analyzed for the three metals. Concentrations of the three metals in fishes were not affected by the temperature differential maintained during the study. There was no correlation in concentrations of cadmium and lead with age (weight and length) of fishes but manganese concentrations declined slightly with age. The water component of the system contained the lowest concentration of the metals with sediments acting as a characteristic sink. Concentrations of the three metals in water and sediments of the ponds were not significant at the .05 level. Aquatic organisms such as snails, fingernail clams, leeches, tubificid annelids and dragonfly nymphs exhibited concentrations of cadmium higher than sediments while snails and duckweed more closely reflected concentrations of manganese in sediments. Tubificid worms and leeches more closely reflected lead concentrations in sediments while fingernail clams and snails exhibited higher concentrations.
W78-05480

BACTERIAL ANALYSIS IN THE WATER OF THE POOLS OF MOULIN-DE-VERT, VERBOIS-GENEVA, (IN FRENCH),
Geneva Univ. (Switzerland). General Microbiology Lab.
M. Boye, and E. Schorer.
Saussurea 6.

Descriptors: Pollutant identification, Bioindicators, Microorganisms, *Bacterial analysis, Coliforms, Geneva, *Moulin-de-Vert(Switz), Pools, Switzerland, Water pollution sources.

Bacterial analysis of the pools of Moulin-de-Vert, Verbois, Geneva, Switzerland, for total organisms and coliforms indicates a high degree of pollution throughout the year. A net increase in the microorganisms was noted during June 1970-June 1973, even though these regions are away from important sources of pollution except the animals which live in the reserve. Copyright 1977, Biological Abstracts, Inc.
W78-05482

EVALUATION OF DATA FOR PONDS, LAKES AND RESERVOIRS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Water Resources Research Center.
J. C. Mawson, and R. J. Reed.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 142, Price codes: A02 in paper copy, A01 in microfiche. Publication No. 66, Termination Report, April, 1976. 20 p, 8 tab, 1 append. OWRT A-067-MASS(1).

Descriptors: *Ponds, *Lakes, *Reservoirs, *Massachusetts, *Data processing, *Data storage and retrieval, Computer programs, Limnology, Pollutant identification, Pond types, PONDI, Pond access, Pond vegetation, Pollutant concentration, FORTRAN program.

Raw data on Massachusetts ponds, lakes, and reservoirs published in foregoing reports are evaluated as a basis for the preparation of an expanded data base that will be directly responsive to the needs of public agencies in Massachusetts. Missing pond data are identified using a computer program, PONDI. Data are summarized by watershed, pond acreage, and number of bodies, and then are put in an accessible form. Ponds were classified and data are presented in tables according to six key types of information: pond type, access, limnological class, vegetation, pollution degree, and pollution type. Data evaluation revealed: (1) 63% of the water bodies (by acre) are either artificial or enhanced by man; (2) almost half the ponds are open to full public access; (3) around 40% of all ponds are eutrophic; and (4) 83% of the ponds in Massachusetts are not classified according to pollution type or degree. (Seip-IPA)
W78-05483

WASTEWATER SAMPLING, TRANSFER AND CONDITIONING SYSTEM,
Raytheon Co., Portsmouth, RI.
For primary bibliographic entry see Field 5D.
W78-05489

VIRUSES IN WASTE, RENOVATED, AND OTHER WATERS, 1975 LITERATURE ABSTRACTS.
Environmental Monitoring and Support Lab. Office of Research and Development.
For primary bibliographic entry see Field 5D.
W78-05490

HEAVY METAL ENRICHMENT IN MINE DRAINAGE: IV. THE ORANGE FREE STATE GOLDFIELD,
Pretoria Univ., (South Africa). Dept. of Chemistry.
G. T. W. Wittman, and U. Foerstner.
South African Journal of Science, Vol. 73, No. 12, p 374-378, December, 1977. 1 fig, 5 tab, 32 ref.

Descriptors: *Mine wastes, *Acid mine drainage, *Heavy metals, *Effluents, *Gold, Uranium, Leaching, Groundwater, Metals, Water analysis, Africa, Industrial wastes, Waste water disposal, Waste water treatment.

A sampling program has been conducted at the Orange Free State Goldfield along the southeastern periphery of the witwatersrand Basin in South Africa in an effort to determine critical sites of heavy metal enrichment in drainage from mining operations. Mining effluents and underground water are currently disposed of by pumping to evaporation dams of slime retention dams. Mine effluents and sediment samples were analyzed for Cl, SO4, Na, Mg, Ca, Mn, Fe, Cr, Co, Ni, Cu, Zn, Cd, and Pb. Analyses of 17 sediment and 14 corresponding water samples collected at various locations within the goldfield revealed that considerable quantities of valuable metals were being lost via mine drainage associated with gold and uranium recovery. Sediments from the Orange Free State Goldfield were enriched with respect to Co, Mn, Ni, Cu, Cd, Cr, and Zn. In general, lower metal concentrations were associated with basic conditions. (See also W77-11544 and W77-10199) (Schulz-FIRI.)
W78-05491

ANALYSIS OF ORGANIC MATTERS IN KRAFT PULP MILL EFFLUENT IN HIRO BAY (HIROWAN KURAFUTO PARUPU KOJO HAISUIKO FUKIN NO YUKIBUTSU NO BUNSEKI),
Government Industrial Research Inst., Hirohata (Japan).
Y. Yamaoka, and T. Tanimoto.
Nihon Kagaku Kaishi, (Journal of the Chemical Society of Japan), No. 10, p 1554-1559, 1977. 10 fig, 3 tab, 21 ref.

Descriptors: Pulp and paper industry, *Gas chromatography, *Mass spectrometry, *Pollutant identification, *Industrial wastes, Sea water, Organic compounds, *Pulp wastes, Effluents, Waste water treatment, *Organic matter, *Organic wastes.

Various organic components were identified in seawater from a bay which received kraft pulp mill effluent. Seawater samples from Hiro Bay, Japan were collected at depths of 0-10 m and filtered. Chloroform, used to extract the seawater, was concentrated under low pressure and fractionated with a silica gel column. Aliphatic hydrocarbons in the first fraction were removed with hexane. Benzene was used to extract the oxygenated compounds from the second fraction. The concentrates were then subjected to gas chromatography and mass spectrometry analyses. Observed retention times were used as a means of identification of the components by comparison with published data. This comparison produced thirty identifiable components including: alpha and beta pinene, fenchone, comphor, borneol, alpha terpineol, longiforene, toluene, p-cymene, guaiacol, vanillin, 2,6-di-t-butyl-4-ethylphenol, fatty acids, aliphatic hydrocarbon, and dimethyl disulfide. (Lisk-FIRL)
W78-05502

SELF-MONITORING PROCEDURES: BASIC PARAMETERS FOR MUNICIPAL EFFLUENTS.
Environmental Protection Agency, Cincinnati, OH. Municipal Permits and Operations Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-274 876, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-430/1-74-015, September, 1974, C.E. Sponagle, Ed. 310 p, 41 fig, 7 tab, 24 ref.

Descriptors: *Pollutant identification, *Biochemical oxygen demands, *Dissolved oxygen analyzers, *Coliforms, *Bacteria, Open channel flow, Open channels, *Chlorine, *Suspended solids, *Monitoring, Filters, *Filtration, Weirs, *Polarographic analysis, Hydrogen ion concentration, *Venturi flumes, Chemical analysis, Data collections, Effluents, Flow measurement, Gages, Instrumentation, Laboratory tests, Municipal wastes, Sampling, Statistics, Water analysis, Geometric mean, Logarithms, Most probable number, Data handling.

Fifteen effluent monitoring procedures for wastewater analysis and flow measurement, to be used by treatment plant operators or technicians under a National Pollutant Discharge Permit, are delineated. Operating procedures, step sequences, operating goals, specifications and a training guide are presented in outline form. The outlined procedures include: (1) determination of 5-day biochemical oxygen demand, (2) Winkler determination of dissolved oxygen-azide modification, (3) determination of dissolved oxygen using a dissolved oxygen meter, (4) determination of dissolved oxygen in wastewater: polarographic probe method, (5) pH determination of wastewater and wastewater treatment plant effluents, (6) collection and handling of bacteriological samples from a wastewater treatment facility, (7) fecal coliform test by the multiple dilution tube method, (8) fecal coliform test by the membrane filter method, (9) calculations of the geometric mean of coliform counts by use of logarithms, (10) measurement of flow in an open channel by parshall flume, (11) measurement of flow in an open channel by sharp-crested weir, (12) amperometric determination of free and combined residual chlorine in water, (13) amperometric determination of total residual chlorine in wastewater, (14) determination of total suspended (non-filterable) solids, mg/l, and (15) reporting of self-monitoring data. (Seip-IPA)
W78-05528

THE USE OF THE ADSORPTION METHOD IN ACTIVATED CHARCOAL WITH EXTRACTION BY CHLOROFORM (CCE) TO EVALUATE THE CONTAMINATION OF RESERVOIRS BY ORGANIC MATERIALS (PRIMENENIYE METODA ADSORBTSII NA AKTIVIROVANNOM UGLE S EKSTRAKTSIEYA KHLOROFORMOM (CCE) DLYA OTSENKI ZAGRYAZNENIYA VODOYEMOV ORGANICHESKIMI VESHCHESTVAMI),
Permskii Politekhnicheskii Inst. (USSR). Dept. of Sanitary Engineering.
Ya. I. Vaysman, and S. Ya. Barikhin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 725, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA-HS-156, 1972, Translated from Gigiena i Sanitariya Vol. 38, No. 8, p 77-79, March 1972. 3 p, 2 ref.

Descriptors: *Water pollution sources, *Water quality standards, *Waste identification, *Pollutant identification, Activated carbon, Adsorption, Separation techniques, Organic matter, Reservoirs, On-site data collections, On-site investigations, Industrial wastes, Evaluation, *Activated charcoal, Chloroform, USSR.

A method for adsorbing organic contaminants in activated charcoal with subsequent chloroform extraction is described as a means of evaluating the contamination of reservoirs by organic materials. Efficacy of the method was evaluated in the Kama and Votkinsk reservoirs (Russia). Since international standards lack recommendations concerning detailed quantitative and qualitative testing of individual organic substances in this complex and do not completely describe construction of units to provide an even supply of water for a prolonged period, the test systems were developed under field conditions and evaluated in seven control ranges and in tap water. Results verified the possibility of using the charcoal-chloroform extraction method in sanitary practice for comparative evaluation of the levels of contamination in river water by organic components of industrial discharges. Based on the field evaluation, a program to study the quality of water in reservoirs by the charcoal-chloroform method was developed covering quantitative measurement of the contamination of reservoirs, separation of extracts into fractions, interpretation of fractions, and extraction of individual components, e.g., acid, neutral, phenol, amphoteric, and basic. (Wares-IPA)
W78-05531

DEVELOPMENT OF A SYSTEM FOR CONDUCTING INTERLABORATORY TESTS FOR WATER QUALITY AND EFFLUENT MEASUREMENTS,
FMC Corp., San Jose, CA. Advanced Products Div.
A. C. Green, and R. Naegele.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 274, Price codes: A07 in paper copy, A01 in microfiche. Report No. EPA-600/4-77-031, June 1977. 131 p, 16 fig, 18 tab, 176 ref, 1 append. 68-03-2115.

Descriptors: *Water quality, *Water pollution, *Monitoring, *Sampling, Laboratories, Laboratory tests, *Pollutant identification, Quality control, Statistical methods, Reproducibility.

A system, developed for evaluating water pollution data and the laboratories that produce these data, consists of a plan for the design and implementation of an interlaboratory test proram, including a pilot test program to evaluate and verify

the complete program. Ongoing interlaboratory testing programs were investigated; dificiencies in their design and in the procedures by which they were conducted were identified. A literature review of previous interlaboratory tests and their methods for experimental design and test data analyses was conducted, and 18 EPA, State, and private water pollution research laboratories were visited to obtain their comments regarding difficulties and deficiencies in interlaboratory test programs. Conclusions indicated that collaborative tests for method development are well defined and are in wide use, whereas interlaboratory testing as a function of laboratory evaluation is under development and subject to different program objectives, design, and statistical evaluations. The recommended interlaboratory test design plan specifies analytical methods and statistical procedures for sample preparation, data analysis, and proficiency evaluation. Proficiency evaluation should be based on interlaboratory testing, utilizing representative samples, quality control procedures, complete statistical analyses, and provision for prompt feedback to participating laboratories. (Wares-IPA)
W78-05534

TRITIUM RETENTION BY COWS AND STEERS AND TRANSFER TO MILK,
Environmental Monitoring and Support Lab., Las Vegas, NV.
For primary bibliographic entry see Field 5C.
W78-05537

EXPERIMENTAL SIMULATION OF SINGLE AND MULTIPLE CELL COOLING TOWER PLUMES,
Corvalis Environmental Research Lab., OR.
L. R. Davis, M. A. Shirazi, and D. L. Slegel.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 359, Price codes: A03 in paper copy, A01 in microfiche. Report No EPA-600/7-77-070, July 1977. 36 p, 10 fig, 2 tab, 19 ref, 1 append.

Descriptors: *Cooling towers, Air pollution effects, Waste dilution, Industrial plants, Entrainment, Distillation, Chemical precipitation, *Path of pollutants, *Plumes, Dissipation.

An experimental investigation investigated the dilution characteristics of single and multiple port buoyant discharges typical of modern natural and mechanical draft cooling towers. Simultaneous measurements of velocity and tracer concentration profiles were taken at various downstream locations in the three-dimensional plumes discharged into a stagnant ambient using a hot film anemometer and conductivity probe. The number of discharge ports was varied from one to seven. Discharge densimetric Froude numbers were varied from 1.5 to infinity. Numerical integration of the profiles gave dilution, tracer conservation, and momentum fluxes. The effect of reducing Froude number was to increase entrainment considerably. In multiple port discharges, the shape of the plume changed from an elongated configuration to nearly exisymmetric within the first 20 to 30 diameters of discharge. Experimental scatter in the results and the inability to accurately measure the low velocities in the tail of the velocity profiles preclude the drawing of firm conclusions at present. Continued measurement experiments using a different anemometer and including ambient velocity effects and discharge line orientation relative to the ambient current are recommended. The appendix contains measured data. (Wares-IPA)
W78-05539

129I IN ANIMAL THYROIDS FROM NEVADA AND OTHER WESTERN STATES,
Environmental Monitoring and Support Lab., Las Vegas, NV. Monitoring System Research and Development Div.
D. D. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 637, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA-600/3-77-067, June 1977. 18 p, 7 tab, 7 ref, 2 append.

Descriptors: *Animal metabolism, *Iodine, *Pollutant identification, Nevada, Radioactivity, Colorado, Wyoming, Iodine radioisotopes, Cattle, Ecology, Animals, Thyroid gland, Exposure, Test sites, Iodine-127, Iodine-129, Nevada Test Site.

A study was conducted to measure the concentrations of Iodine-129 in the thyroid glands of animals that reside on and near the Nevada Test Site for nuclear devices; these data were then correlated with those from similar studies made near other nuclear facilities. The animals sampled included various species of wild animals and cattle from herds maintained on the site since 1957 as biological monitors as well as cattle and goats used for special research projects. Data from over 80 thyroids collected during 1973, 1974, and 1975 from animals residing on the Nevada Test Site indicate that Iodine-129 levels in these thyroids are near background levels. The median levels in the thyroids of animals living on the Nevada Test Site are slightly elevated from those found in northern Nevada, but are similar to those found near Denver, Colorado, and Rawlings, Wyoming. Statistical analyses of the Iodine-129/Iodine-127 ratios in cattle thyroids suggest that three populations were sampled: northern Nevada cattle considered as baseline population, corralled Nevada Test Site Cattle with intermediate ratios, and free-grazing cattle from Nevada Test Site and Rocky Flats, Colorado, with the highest ratios reported. It was concluded that the Nevada Test Site is not a significant source of Iodine-129. The appendices describe thyroid sample and analysis procedures. (Ware-IPA)
W78-05541

RELIABLE ANALYSES OF WATER BY INDUCTIVELY COUPLED PLASMA EMISSION SPECTROSCOPY,
Environmental Research Lab., Athens, GA.
C. E. Taylor.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 644, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-600/2-77-113, June 1977. 32 p, 21 tab, 4 ref.

Descriptors: *Spectroscopy, *Trace elements, *Water analysis, Pollutants, *Pollutant identification, Chemical analysis, Sampling, Monitoring, Analytical techniques, Inductively coupled plasma emission spectroscopy, Multielement water analysis, Atomic spectroscopy.

An evaluation of an instrument, the inductively coupled plasma emission spectrometer (ICPES), for the rapid multielement analysis of water samples, was conducted. ICPES data were compared with spark source mass spectrometer data following analysis of cross-check solutions from plating plants. When major differences were detected between data sets, further evaluation attributed these differences to stray light from calcium and magnesium lines in the ICPES. Steps taken to improve the instrument's performance, including calcium and magnesium correction procedures, are described. Surfaces in the secondary optical system were painted to prevent light scatter and the aperture at the primary lens was reduced; interference corrections were reduced by more than one order of magnitude. Reduced interferences and improved corrections have improved the accuracy of the multielement analysis system. Observed background changes caused by the presence of magnesium were compensated for by adding matrix elements to calibration standards. Alcohol was added to standards, reagent blanks, and samples to overcome problems of background change during analysis of samples of unknown organic content such as municipal sewage. Comparison of data from the improved ICPES with those of other analytical instruments in characterizing the same water samples indicated that the ICPES has great reliability as a technique for the multielemental analysis of water. (Wares-IPA)
W78-05542

THE STATUS OF THE EPA LABORATORY AUTOMATION PROJECT,
Environmental Monitoring and Support Lab., Cincinnati, OH. Physical and Chemical Methods Branch.
For primary bibliographic entry see Field 5G.
W78-05547

DETECTION AND INACTIVATION OF ENTERIC VIRUSES IN WASTEWATER,
Hebrew Univ., Jerusalem (Israel). Environmental Health Lab.
For primary bibliographic entry see Field 5D.
W78-05548

COMPREHENSIVE SUMMARY OF SLUDGE DISPOSAL RECYCLING HISTORY,
Metropolitan Denver Sewage Disposal District No. 1, Commerce City, CO.
For primary bibliographic entry see Field 5E.
W78-05550

INVESTIGATION OF A HONEYWELL DISSOLVED OXYGEN PARAMETRIC SYSTEM,
Environmental Monitoring and Support Lab., Cincinnati, OH. Instrumentation Development Branch.
For primary bibliographic entry see Field 5D.
W78-05552

ANILINES: SELECTIVE TOXICITY TO BLUE-GREEN ALGAE,
Texas Univ. at Austin, Port Aransas. Marine Science Inst.
For primary bibliographic entry see Field 5C.
W78-05556

TRITIUM OXIDE UPTAKE BY ALGAE: AN INDEPENDENT MEASURE OF PHYTOPLANKTON PHOTOSYNTHESIS,
Michigan State Univ., Hickory Corners. W.K. Kellogg Biological Station.
K. R. McKinley.
Limnology and Oceanography, Vol 22, No 2, March 1977, p 377-380, 1 tab, 15 ref. NSF (GB-40172 and BMS-75-20322, ERDA (E-11-1599, COO-1599-102).

Descriptors: *Productivity, *Phytoplankton, *Photosynthesis, Algae, Analytical technique, Adsorption, Tritium, Measurement, *Absorption, *Pollutant identification.

A new method is presented for estimating algal productivity using tritium oxide. Close agreement is seen between this method and the traditional method of measuring C14-C02 uptake and 02 evolution. The method shows low error and has the advantage of being useful under conditions wher conventional methods are not appropriate. Disadvantages of the method include the large isotopic discrimination factor, the relatively more difficult proparation and counting procedures necessary, and the relatively high specific activities necessary to achieve an isotopic abundance of even 2% of that used in C14 isotope studies. (Chilton-ORNL)
W78-05559

CHARACTERIZATION AND IMPACT OF STORMWATER RUNOFF FROM VARIOUS LAND COVER TYPES,
Wiggins-Rimer and Associates, Durham, NC.
For primary bibliographic entry see Field 5B.
W78-05580

A MULTIDIMENSIONAL ANALYSIS OF THE RESULTS OF THE FRENCH 1971 SURFACE WATER QUALITY NETWORK CONTROL IN THE RIVER BASIN 'SEINE-NORMANDIE',
Ecole Nationale Superieure des Mines de Paris, Fontainebleau (France). Center for Geological Information.
Y. LeFoll, R. Pinoit, and A. Lesouef.
Progress in Water Technology, Vol. 9, No. 1, p 98-102, 1977. 12 fig, 2 ref.

Descriptors: *Surface waters, *Watersheds(Basins), *Water quality, Rivers, Europe, Sampling, Foreign countries, Surveys, Foreign research, Data processing, Temperature, Water temperature, Biochemical oxygen demand, Chemical oxygen demand, Hydrogen ion concentration, Conductivity, Dissolved oxygen, Ions, Phosphates, Bacteria, Anions, Nitrates, Metals, Water pollution sources, *France, *Seine River(France).

During 1971 a systematic program to sample surface waters in France was established. For the river basin 'Seine-Normandie,' the program resulted in approximately 1,800 water samples and 50,000 items of data on existing water quality within the basin. A series of computerized methods were used to analyze the results: (1) Thirteen types of water were identified and characterized according to their composition, taking into account analytical results on about 40 water quality parameters. A map was prepared to show their geographical distribution. (2) By comparing analytical results to water quality standards, the parameters responsible for quality downgrading of each sample were identified. A single quality grade then was assigned to the sample according to the concentration of the limiting parameters. A cluster analysis regrouped all the samples into ten groups according to pollution intensity and the nature of the limiting parameters. A map of nuisance areas was drawn, and a tabulation of parameters most frequently responsible for quality downgrading was made. (3) The most important seasonal effects were identified; the effects of flow and temperature variations were shown to be important mainly on dissolved oxygen, nitrate content and salinity. (4) Practical conclusions were drawn in order to aid surface water quality management in the river basin 'Seine-Normandie'. (Sims-ISWS)
W78-05581

METHOD AND APPARATUS FOR SAMPLING IMPURE WATER,
Hach Chemical Co., Ames, IA. (Assignee).
C. C. Hach, and M. D. Buck.
U.S. Patent No. 4,053,282, 4 p, 1 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 963, No 2, p 587, October 11, 1977.

Descriptors: *Patents, *Sampling, *Water sampling, Analysis, Analytical techniques, Monitoring, Water analysis, Water pollution, *Pollutant identification.

An object of the invention is to provide a method and apparatus for sampling impure water that keeps the sample intake line clear and open for long periods of operations. An addition such a method and apparatus that avoids adverse affects of air or other gas bubbles in the system is provided. The colorimetric liquid analyzer includes a glass tube cell, a plunger mounted for reciprocation in the cell, and a long liquid sample supply tube running from the body of water to be tested to the plunger passage. A 'T' connector is provided in the tube and a pair of on-off valves which together with the plunger, act to pump fixed volumes of fluid into and out of the cell. Means are also provided to pump substantial air bubbles into the tube near its intake end, and the air bubbles are separated from the liquid through a vertical section of the T-connector so that only liquid is pumped into the cell. (Sinha-OEIS)
W78-05606

EVALUATION OF THE NATIONAL ENVIRONMENTAL SPECIMEN BANK SURVEY,
National Bureau of Standards, Washington, DC. Analytical Chemistry Div.
D. A. Becker, and E. J. Maienthal.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 823, Price codes: A13 in paper copy, A01 in microfiche. Report No. EPA-600/1-77-015, February 1977. 28 p, 198 ref, 4 append. 1AA601, IAG-D4-0568.

Descriptors: *Evaluation, *Basic data collections, Information exchange, Monitoring, Sampling, Networks, Surveys, Environmental effects, Information retrieval, Storage, Analytical techniques, *National Environmental Specimen Bank(NESB), Environmental Surveys, Specimens.

A joint survey program was performed by Oak Ridge National Laboratory in an attempt to identify and obtain information from organizations and individuals presently collecting and storing environmental specimens to be used by EPA in establishing a National Environmental Specimen Bank (NESB). The evaluation was concerned with storage and sampling and analytical methodology. The survey obtained information on 663 existing specimen and data collections in the United States. Evaluation of apparent usefulness has indicated that few, if any, of these presently existing collections have sufficient documented information indicating they had been sampled, processed, and stored under the exacting conditions required for retrospective chemical analysis of various trace substances. Additional contacts with the custodians of potentially useful collections are encouraged, and it is also recommended that guidelines currently being established by NBS for container and implement cleaning, sampling, processing, and short- and long-term storage should be widely disseminated in order to upgrade these methodologies for those organizations and/or individuals who are interested in future retrospective capabilities. The appendices contain literature surveyed on sampling, sample handling, and storage for the NESB, the NESB survey form, evaluation criteria for existing environmental specimen collections, and evaluation of individual survey replies. (Wares-IPA)
W78-05617

FIELD MEASUREMENT OF DENITRIFICATION,
California Univ., Davis. Dept. of Land, Air and Water Resources.
D. E. Rolston, and F. E. Broadbent.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 998, Price codes: A05 in paper copy, A01 in microfiche. Report No. EPA-600/2-77-233, November, 1977. 75 p, 40 fig, 15 tab, 13 ref. IHB617, R-804259.

Descriptors: *Denitrification, *Soil moisture, *Vegetation effects, Irrigation, Nitrates, Nitrites, Nitrogen compounds, Soil environment, Soil management, Gases, Nitrogen cycle, Nutrient removal, Fertilizers, Soil treatment, *Gas flux, Nitrogen isotopes, Nitrogen oxide, Yolo soil, Crop root system.

Denitrification from a Yolo loam field profile was studied in relation to the influence of soil-water content, organic carbon source, and temperature. Field plots were instrumented with soil atmosphere samplers, soil solution samplers, and tensiometers. The two soil-water pressure treatments were applied in topsoil. Three levels of soil carbon were studied by evaluating plots cropped with ryegrass, uncropped plots, and plots amended with manure. Experiments were conducted at soil temperatures of 8 and 23C. Fertilizer was applied as KN03 enriched with N15. The flux of volatile gases at the soil surface was measured from the accumulation of N20 and nitrogen gas isotopes beneath an airtight cover placed over the soil surface. Denitrification at 23C ranged from 73% of the fertilizer nitrogen for the manure treatment to 1% for the uncropped treatment. At 8C, denitrification ranged from 11% for the manure treatment to zero for uncropped plots. The nitrite flux at the soil surface varied between 5 and 26% of total denitrification. The results demonstrated that denitrification of soil can occur at high rates (highest soon after application of NO3(-) fertilizer to wet soil), and that the presence of a crop root system has a large positive influence on denitrification. (Wares-IPA)
W78-05619

DRINKING WATER SYSTEMS FOR THE TRAVELING PUBLIC: A STATUS REPORT.
Environmental Protection Agency, Washington, DC. Office of Water Supply.
For primary bibliographic entry see Field 5F.
W78-05623

WATER QUALITY DATA STORAGE AND RETRIEVAL,
Environmental Health Lab. Kelly AFB, TX.
R. A. Virost.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-030 106, Price codes: A05 in paper copy, A01 in microfiche. Report No EHL(K)-76-4, July 1976. 7 p, 2 fig, 10 tab, 4 append. 74-19.

Descriptors: *Computer programs, *Computer systems, *Data collections, *Data storage and retrieval, Monitoring, *Pollutant identification, Instrumentation, Water quality, Analytical techniques, *Water quality data, AFR 19-1, AFR 19-7, EPA STORET, AFLC CREATE, USGS NAWDEX, USGS WASTORE, Environmental monitoring, Master Data Repository.

Several computer systems designed to convert data generated by Air Force Medical Service monitoring of environmental water quality (as mandated by AFR 19-1 and AFR 19-7) into usable information are investigated. Such information is to be used for (1) documenting present pollution levels, (2) determining the effectiveness of corrective measures, (3) appraising the character of unique Air Force waste discharges, and (4) monitoring the effects of Air Force operations on the water environment. The possible computer systems evaluated were AFLC CREATE system, USGS NAWDEX and WATSTORE systems, and EPA STORET system. Study results indicate that the Air Force should develop its own water quality data storage and retrieval computer program using a data identification system that is compatable with EPA STORET; until such a computer system is developed, EPA STORET should be used. The eventual Air Force water data system will be part of a Master Data Repository for all types of Air Force environmental monitoring. Modifications in current site identification and sample submission procedures of AFR 19-7 will be required in order to include water sample analysis data in the Repository. These modifications are discussed, and recommended new procedures are presented in the appendices. (Seip-IPA)
W78-05676

EVALUATION OF TWO METHYLENE BLUE METHODS FOR ANALYZING MBAS CONCENTRATIONS IN AQUEOUS SOLUTIONS,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering; and Rensselaer Polytechnic Inst., Troly, NY. Dept. of Environmental Engineering.
L. K. Wang, W. N. Shuster, and P. J. Panzardi.
Journal American Water Works Association, Vol 67, No 4, p 182-184, April, 1975. 1 fig, 6 tab, 4 ref. RPI IBN 25.

Descriptors: *Detergents, *Spectrophotometric, Linear alkylate sulfonate(LAS), Mathematical models, Equations, *Analytical techniques, *Colorimetry, Color reactions, *Pollutant identification, Measurement, Testing, *Methylene blue

test, Modified methylene blue test, Anionic surfactants, Anionic detergents, Spectrophotometric analysis, Methyelene blue active substances(MBAS), Calibration curve.

The precision, accuracy, and reproductivity of two methylene blue spectrophotometric methods (the standard time and step-consuming procedure, and a modified and purportedly simplified, improved process), of determining anionic detergent concentration in water were tested using linear alkylate sulfonate (LAS) as standard anionic surfactant. Both colorimetric methods yielded similar but not identical LAS calibration curves; the modified method yielded a more feasible measurement at low LAS levels and required only 8 minutes per test (as compared with 60 minutes for the standard test). The analytical methods were evaluated for precision using standard deviation (S), relative standard deviation (RSD), and range (R) and for accuracy using error (E) and relative error (RE); formulas for each are presented. Evaluation of precision and accuracy of the modified methylene blue method was made using the standard method as reference and four different LAS concentrations (0.364, 0.728, 1.456, and 2.184 mg/l); 20 independent LAS determinations (as % transmittance) were made for each of the four LAS concentrations. Standard deviations of the % transmittance were 0.22, 0.26, 0.16 and 0.29, respectively. A mathematical model of spectrophotometric data is developed by the method of least squares to use in the comparison of the two methods. An equation is introduced for representing LAS concentration vs. % transmittance data. Using this equation LAS concentrations are mathematically derived from % transmittance data; S, RSD, R,E, and RE are calculated. All data and calculated results are presented in tabular form. (Seip-IPA)
W78-05678

MODIFIED METHYLENE BLUE METHOD FOR ESTIMATING MBAS CONCENTRATION,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering; and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
L. K. Wang.
Journal American Water Works Association, Vol 67, No 1, p 19-21, January, 1975. 2 fig, 4 ref. DAAK02-73-C-0206.

Descriptors: *Surfactants, *Spectrophotometry, *Linear alkylate sulfonate(LAS), *Colorimetry, *Color reactions, *Detergents, *Analytical techniques, *Pollutant indentification, Water quality, Measurement, Testing, Foaming, Surface tension, Anions, *Methylene blue test, *Modified methylene blue test, *Anionic surfactants, Spectrophotometric analysis, *Methylene blue active substances(MBAS), Absorbance, Synthetic detergents, Filter photometry, Alkyl benzene sulfonate(ABS), Chloroform-extractable pollutants.

The principle reagents, apparatus, and analytical procedures required to perform an improved and simplified methylene blue spectrophotometric test for determination of wastewater anionic detergent concentrations are described using linear alkylate sulfonate (LAS) as the test detergent. The new procedure significantly reduces the number of reagents, apparatus, and solvent extractions required for each test, the interference caused by chloroform-extractable pollutants, and the time required for each test. Interferences which occur in the standard analytical method and result from the reaction of methylene blue with several organic and inorganic compounds sometimes present in wastewaters are not eliminated in the modified procedure. Positive errors occur more frequently than negative ones when determining anionic detergent concentrations in water. (Seip-IPA)
W78-05679

A TEST METHOD FOR ANALYZING ANIONIC OR CATIONIC SURFACTANTS IN INDUSTRIAL WATER,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering; and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
L. K. Wang.
Journal of the American Oil Chemists' Society, Vol 52, p 339-344, September, 1975. 1 fig, 34 ref, 1 append. W/A 86-294. DAAK02-73-C0-0206.

Descriptors: *Volumetric analysis, *Surfactants, *Detergents, *Linear alkylate sulfonate(LAS), *Analytical techniques, *Chemical analysis, Anions, Cations, Aqueous solutions, Water quality, Measurement, Testing, *Pollutant identification, Two-phase titration, Anionic surfactants, Cationic surfactants, Cetyldimethylbenzylammonium chloride(CDBAC), Quaternary ammonium compounds, Sodium tetraphenylboron(STB), Solution standards.

Procedures are presented for two-phase titration (a stoichiometric analytical method for quantitative identification of either cationic or anionic surfactants present in unknown wastewater samples). Two calibration curves for use in quantifying surfactant concentration are prepared using cetyldimethylbenzylammonium chloride (CDBAC) and linear alkylate sulfonate (LAS) as cationic and anionic (respectively) surfactant reference standards and sodium tetraphenylboron (STPB) solution standard as anionic surfactant titrant. Appropriate amounts of methyl orange dye, buffer reagent, chloroform and standard CDBAC are added to a 30 ml unknown water sample. CDBAC (30 ml) is added to ensure that the sample contains an excess of cationic surfactant. The solution is titrated with STPB to the end point. The amount of STPB titrant required to reach end point is compared to a reference sample (made with distilled water) requiring 35 ml STPB titrate to reach end point. Four possible titration results exist: (1) less than 35 ml of standard anionic STPB titrant is spent to reach end point, indicating that the unknown sample contains anionic surfactant; its level can be quantified by reading from the anionic (LAC) calibration curve and reported in mg/l as LAC. (Anionic surfactant level can also be determined by subtracting the anionic STPB titrant used from the amount of cationic CDBAC initially added to the unknown). (2) More than 35 ml of anionic STPB titrant are required to reach end point, indicating that the unknown contains cationic surfactant; its level is read from the cationic CDBAC calibration curve and is reported in mg/l as CDBAC. (Cationic surfactant level can also be determined by subtracting the amount of cationic CDBAC initially added to the unknown from the amount of anionic STPB spent in reaching end point. (3) 35 ml of STPB titrant are required, indicating that the unknown contains nonionic, undetectable, or no surfactant. (4) No STPB titrant is required, indicating that the concentration of anionic surfactant is too high; the sample should be diluted and retested. Procedural limitations and alternative uses for two-phase titration are discussed. (Seip-IPA)
W78-05681

DETERMINING CATIONIC SURFACTANT CONCENTRATION,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering; and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
L. K. Wang, and D. F. Langley.
Ind. Eng. Chem., Prod. Res. Div., Vol 14, No 3, p 210-212, 1975. 2 fig, 9 ref.

Descriptors: *Surfactants, *Spectrophotometry, *Colorimetry, *Color reactions, *Detergents, *Analytical techniques, Pollutant identification, Water quality, Cations, Measurement, Testing, *Methyl orange method, *Cationic surfactants, Spectrophotometric analysis, Calibration curves, Methyl orange active substances(MDAS), Cetydimethylbenzylammonium chloride(CDBAC), Chloroform extraction, Absorbance.

A methyl orange method for the accurate spectrophotometric determination of cationic surfactants in the 0.10 to 1.25 mg/l range is described. The steps include complexation of cationic surfactant with methyl orange at acidic condition, chloroform extraction, water-chloroform phase separation, and spectrophotometric measurement. The water sample to be analyzed is treated with 50 ml of chloroform and an excess of methyl orange reagent in the presence of a pH 3 buffered solution. The methyl orange reacts with the cationic surfactant forming a chloroform soluble complex. The complex is dissolved in the chloroform phase by rapidly shaking the separatory funnel for a short time. Since chloroform is heavier than water, the chloroform phase can be separated from the water phase simply by gravity separation. The intensity of yellow color in the chloroform layer is directly proportional to the methyl orange complex; thus, the intensity of the yellow color can be subsequently measured by the use of a spectrophotometer (light path = 10 cm). The absorbance curves cover a wavelength range of 300-500nm. The absorbance curves for both 50 and 10 micrograms surfactant (cetyldimethylbenzylammonium chloride) samples treated show an absorbance maximum at 415 nm. It is suggested that calibration curves be prepared for all known methyl orange-cationic surfactant complexes to expedite accurate quantitative analyses within certain concentration ranges. If the cationic surfactants present in water are of an unknown type, the cationic surfactant concentration measured by the methyl orange method is reported to be 'mg/l MOAS' (methyl orange active substances). (Seip-IPA)
W78-05682

DETERMINATION OF ANIONIC SURFACTANTS WITH AZURE A AND QUATERNARY AMMONIUM SALT,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering; and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
L. K. Wang, and P. J. Panzardi.
Analytical Chemistry, Vol 47, No 8, p 1472-1475, July 1975. 2 fig, 2 tab, 12 ref. IBN 25.

Descriptors: *Volumetric analysis, *Surfactants, *Detergents, *Linear alkylate sulfonate, *Chemical analysis, Analytical techniques, *Pollutant identification, Anions, Cations, Ions, Aqueous solutions, Water quality, Measurement, Testing, Two-phase titration, Azure A, Methyl orange, Anionic surfactants, Cetyldimethylbenzylammonium chloride(CDBAC), Quaternary ammonium compounds, Solution standards.

A new two-phase titration method, used in the determination of anionic surfactants in water and involving the use of Azure A (AA) and methyl orange as primary and secondary dye, respectively, is described. The water sample to be analyzed is introduced into a separatory funnel where AA, buffer and organic solvent (chloroform or carbon tetrachloride) are added in appropriate amounts. The solution is titrated with cationic surfactant cetyldimethylbenzylammonium chloride (CDBAC); methyl orange is added to the sample to pinpoint the end point as it is approached. A calibration curve, plotting linear alkylate sulfonate (LAS) (anionic surfactant) vs ml of 50-mg/l CDBAC cationic titrate spent is used to determine concentration of anionic surfactant in the unknown. The precision and accuracy of the test method were determined to be slightly higher or equal to the standard methylene blue spectrophotometric method. This AA titration method is simpler and less time-consuming and can be carried out in the field. Any pure quaternary ammonium salt can be used as titrant. (Seip-IPA)
W78-05683

STATE-OF-THE-ART: MILITARY EXPLOSIVES AND PROPELLANTS PRODUCTION INDUSTRY, VOL. I - THE MILITARY EXPLOSIVES AND PROPELLANTS PRODUCTION INDUSTRY,
American Defense Preparedness Association, Washington, DC.
For primary bibliographic entry see Field 5B.
W78-05684

5B. Sources Of Pollution

MNO2 DEPOSITION IN FEEDLOT WATER LINES IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W78-05202

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF VOLUME XIII. CONTAMINANT BASELINES.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05218

PROCESSES OF CARBON DIOXIDE FLUX IN THE FANNING ISLAND LAGOON,
Hawaii Inst. of Marine Biology, Honolulu.
S. V. Smith, and F. Pesret.
Pac Sci 28(3), p 225-246, 1974.

Descriptors: *Path of pollutants, Water pollution sources, *Carbon dioxide, Pacific Ocean islands, *Organic carbon, Lagoons, Rain, Fanning Island.

Carbon dioxide follows a variety of transfer pathways through marine systems and a budget of CO2 can be used to enumerate thos pathways. In a coral reef system, the biogeochemical pathways of organic carbon production-consumption and calcification are likely to be prominent. Measured were the temperature, salinity, pH and total alkalinity of about 400 water samples to describe the CO2 budget at Fanning Island, Line Islands (Central Pacific) during July and Aug. 1972. Mean lagoon salinity was about 31.5%, or 3.3‰ below the open ocean salinity there, as a result of heavy rainfall and groundwater seepage. This salinity depression, together with data on rainfall and tides, was used to calculate a mean lagoon water residence time of about 1 mo. The CO2 budget of the lagoon water can be described in terms of processes altering the ocean water composition. Gas exchange accounted for a net CO2 evasion of less than 1.4 moles m-2 mo. -1. Freshwater dilution lowered CO2 change attributable to organic C transfer lay between -1 and +1.3 mol m-2 mo. -1. Net organic C transfer in the lagoon is near zero, suggesting a close balance between organic C production and consumption. Calcification is about 1 kg CaCO3 m-2 yr -1, much lower than the rate which can be estimated from the standing crop and expected growth rate of corals there. The CO2 system of Fanning Island, and perhaps of other coral reefs, may be potentially limiting to biological activity.--Copyright 1975, Biological Abstracts, Inc.
W78-05229

FORESTS AND WATER QUALITY,
Northeastern Forest Experiment Station, Durham, NH.
J. W. Hornbeck.
Available from the USDA Forest Service 370 Reed Rd., Broomall, Pa. 19008. In: Water Resources at the Forest-Urban Interface. Pinchot Institute Consortium Publication PIEFR-PA-2, p 11-13, 1977. 20 ref.

Descriptors: Forests, *Streamflow, *Water quality, *Sedimentation, Temperature, Nutrients, Forest watersheds, Clearcutting, Water pollution sources, Forest clearing, Nutrient cycling, Even-age management, Forest fertilization.

Forested watersheds that are the source areas for much of the Northeast's supply of clean water are sustaining increased usage in the form of timber production, recreation, wildlife habitat, aesthetics, and land development. This article reviews pertinent literature and presents research needs for maintaining the high quality of forest streams. (Forest Service)
W78-05245

WHEN SKI TRAILS ARE CUT THROUGH FOREST LAND, WHAT HAPPENS TO STREAMFLOW,
Northeastern Forest Experiment Station, Durham, NH.
For primary bibliographic entry see Field 4C.
W78-05249

STUDY OF THE ECOLOGY OF IRON BACTERIA OF FRESH WATER RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow, Inst. Mikrobiologii.
For primary bibliographic entry see Field 5C.
W78-05269

MERCURY CONTAMINATION: A HUMAN TRAGEDY,
Michigan State Univ., East Lansing. Dept. of American Thought and Language.
For primary bibliographic entry see Field 5C.
W78-05278

CORRELATION COEFFICIENTS IN CHARACTERISTICS OF BACTERIOPLANKTON AND EVALUATION OF THEIR IMPORTANCE IN MODELING, (IN RUSSIAN),
Irkutskii Gosudarstvennyi Univ. (USSR). Scientific Research Inst. of Biology.
For primary bibliographic entry see Field 5C.
W78-05285

PILOT-SCALE STUDIES OF THE LEACHING OF INDUSTRIAL WASTES IN SIMULATED LANDFILLS,
J. R. Newton.
Journal of the Institute of Water Pollution Control, Vol. 76, No. 4, p 468-480, 1977. 5 fig, 5 tab, 2 ref.

Descriptors: *Leaching, *Oil wastes, *Nickel, *Chromium, *Pilot plants, Aerobic conditions, Anaerobic conditions, Domestic wastes, Metals, Waste water treatment, Industrial wastes.

Leaching properties of industrial wastes and domestic waste mixtures were studied with simulated landfills under aerobic and anaerobic conditions. Six pilot-scale landfills received one of three industrial wastes: aqueous oil emulsion; cyanide sludge; and metal-hydroxide sludge composed of nickel, chromium, and iron. Half of these experiments were conducted under anaerobic conditions and the other half under aerobic conditions. Six corresponding small-scale experiments were conducted under conditions similar to the preceding except that artificial leaching was employed rather than natural rainfall as used in the pilot-scale experiments. Samples of leachate taken after three years indicated that organic carbon concentrations and metal concentrations were lower and the pH higher under aerobic conditions. The maximum concentration of oil in the leachate was 300 mg/liter; less than 2% of the oil added was not leached from the domestic waste. Leachate concentrations of cyanide from the pilot-scale tests were 7 mg/liter or less; concentrations in small-scale experiments did not exceed 270 mg/liter. Over the three-year study period, 3% of the cyanide added was leached. Metal quantities leached were 0.2% of the nickel and 0.3% of the chromium with respect to the weight in the sludge.
W78-05303

LONG TERM PEACE RIVER CHARACTERISTICS AS A MEASURE OF A PHOSPHATE SLIME SPILL IMPACT,
University of South Florida, Tampa. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W78-05328

CHARACTERISTICS AND TREATMENT OF BREWERY WASTES,
For primary bibliographic entry see Field 5D.
W78-05336

WORKSHOP PROCEEDINGS: RESEARCH NEEDS RELATED TO ACID MINE WATER.
West Virginia Univ., Morgantown. Water Research Inst.
For primary bibliographic entry see Field 5G.
W78-05345

PESTICIDES IN IOWA SURFACE WATERS: SUMMARY OF A WORKSHOP HELD MARCH 1977.
Iowa State Water Resources Research Inst., Ames.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 045, Price codes: A07 in paper copy, A01 in microfiche. Report No. ISWRRI - 83, March, 1977. R.V. Bulkley, Ed. 117 p, 2 fig, 18 tab, 40 ref. OWRT A-999-IA(15).

Descriptors: *Pesticides, *Toxins, *Pesticide residues, *Fish toxins, Fish, Aquatic life, *Water quality control, *Pollutant identification, *Aquatic animals, *Fish conservation, *Iowa, Water pollution effects, Path of pollutants, Food chains, Aquatic population, Potable water, Lakes, Streams, Bottom fish, Surface water, Pesticide concentration, Terrestrial vertibrates, Cedar River, Iowa River, Des Moines River.

Proceedings of a workshop designed to update data on pesticides in Iowa lakes and streams and attempt to identify areas needing additional research, assemble information on types and concentrations of pesticides found, and investigate the relation of these concentrations to levels that are known to be harmful are reported. Included are abstracts of presentations on quantities and kinds of pesticides found under conditions of varying rainfall and in: (1) public drinking water supplies, (2) fish from the Iowa and Cedar Rivers, (3) small Iowa streams, (4) livestock water and farm ponds, (5) the Des Moines River, and (6) water, fish and Great Blue Heron chicks of Rathbun and Red Rock Reservoirs. Interpretations of these data are made with regard to potential harm to human health, fish and aquatic life, domestic animals, and wildlife. Current and new regulations are outlined and insecticide use is projected. A summary of available data and a list of publications containing pesticide data are included. (Seip-IPA)
W78-05349

NON-POINT SOURCES OF WATER POLLUTION.
Oregon State Univ., Corvallis. Water Resources Research Inst.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 042, Price codes: A05 in paper copy, A01 in microfiche. Seminar, July, 1976. 92 p, 14 fig, 11 tab, 123 ref. OWRT A-999-ORE(18).

Descriptors: *Pollutant identification, Water pollution sources, Forest soils, Ranges, Runoff, Agricultural runoff, Livestock, Land use, Planning, Air pollution effects, Construction, Management, Path of pollutants, *Non-point pollution sources, Cropland runoff.

Ten papers delivered at a series of public seminars on non-point water pollution sources, include: (1) The Problem in Perspective, (2) Inorganic Pollution from Forests and Rangelands, (3) Forests and Rangelands as Sources of Chemical Pollutants, (4) Cropland Run-off, (5) Livestock Production as Source of Pollutants, (6) Land Use Planning and Non-Point Source Pollution, (7) Water Pollution from Urban and Other Non-Agricultural Areas, (8) Rainfall Contamination by Airborne Pollutants, (9) Control of Pollution from Construction Activities, and (10) Managing Non-Point Source Pollution. The combined focus emphasizes the diverse origins of the non-point sources which have emerged as the principal cause of water quality degradation in Oregon. (Seip-IPA)
W78-05352

BIOLOGICAL ASSESSMENT OF THE SOLUBLE FRACTION OF THE STANDARD ELUTRIATE TEST,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W78-05366

SEDIMENT STUDIES IN BACK RIVER ESTUARY, BALTIMORE, MARYLAND.
National Enforcement Investigations Center, Denver, CO.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 584, Price codes: A03 in paper copy, A01 in microfiche. EPA-330/2-76/021, April 1976. 36 p, 16 fig, 4 tab, 6 ref.

Descriptors: *Water pollution sources, Pollutant identification, *Sediments, *Sludge, *Dredging, *Oxygen demand, *Maryland, Correlation analysis, Nutrients, Water quality control, Diversion, Sampling. Data collections, Relocation, *Black River Estuary(Md), Baltimore(Md), Sediment oxygen demand.

An investigation was reported of the Back River Estuary located in Maryland. The study objectives were: to determine in-situ sediment oxygen demand rates of the surficial bottom deposits; to determine the general distribution and approximate depth of organic sludge deposits; to compare the sediment oxygen demand of surficial to underlying sediments; to determine existing nutrient concentrations of surficial and subsurface sediments; and to evaluate the Maryland Water Resource Authority engineering proposals for improving the water quality of the Back River Estuary. (Singh-ISWS)
W78-05369

TECHNICAL REQUIREMENTS AND ANALYSIS METHODS FOR EVALUATING THE ENVIRONMENTAL CONSEQUENCES OF GROUNDWATER CONTAMINATION,
BCS., Inc., Richland, WA.
R. W. Nelson.
Progress in Water Technology, Vol. 9, No. 1, p 167-181, 1977. 6 fig, 20 ref.

Descriptors: *Groundwater, *Water pollution, *Groundwater movement, *Path of pollutants, Evaluation, Pollutants, Injection wells, Waste disposal, Solutes, Reservoirs, Rivers, Environment, *Groundwater contamination, Environmental impact statements, Arrival times, Arrival locations.

An important evidence of public concern for environmental quality is the requirement for 'Environmental Impact Evaluations and Statements' which consider, evaluate, and formally state the probable effect of some proposed, continuing action by man on the environment. These statements are intended to help public and regulatory authorities weigh and select the options best suited to use the environment for man's benefit, while guarding against any abuse of this privilege. However, too often the effectiveness of environmental statements is nullified by public relations pressures which tend to exclude facts and scientifically analyzed alternatives. If such divergence from technical quality continues to occur, the environmental evaluation and statement concept will degenerate into a costly bureaucratic ritual, rather than play its intended beneficial role. (Sims-ISWS)
W78-05372

SEDIMENTATION OF DISPERSED OIL IN SURFACE WATERS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. of Aquatic Sciences.
M. Thuer, and W. Stumm.
Progress in Water Technology, Vol 9, No 1, p 183-194, 1977. 4 fig, 1 tab, 16 ref.

Descriptors: *Oil, *Surface waters, *Sediments, Water pollution, Pollutants, *Path of pollutants, Oil wastes, Gasoline, Absorption, Colloids, Coagulation, Organic compounds, Dispersion, Suspended solids, Model studies, Mathematical models, Laboratory tests, Sedimentation, Aggregates, Agglomerates.

Substantial quantities of water polluting mineral oil components find their way into the sediments of surface waters. Hydrocarbons settle it they get attached to settling particulate material (biological debris, clays, CaCO3, metal oxides, etc.) by adsorption and by agglomeration (coagulation) of colloidal droplets with suspended matter. Formation of dispersed oil droplets from an oil film or oil layer depends strongly on the water turbulence (velocity gradient) and on the interfacial tension of the oil-water interface, which in turn is affected by surfactants (emulsifiers) incipiently present in the oil. Agglomeration of oil droplets with other suspended solids typically present in the water is a prerequisite for substantial oil sedimentation. A simple model based on surface charge densities and mass densities of the hetero-colloids coagulating predicted the conditions under which dispersed oil becomes agglomerated and evaluated whether the agglomerates formed will settle or rise. (Sims-ISWS)
W78-05373

PILOT PLANT INVESTIGATION OF THE EVOLUTION OF VARIOUS POLLUTANTS DURING ARTIFICIAL RECHARGE OF AN AQUIFER BY A BASIN,
Societe Lyonnaise des Eaux et de l'Eclairage (France).
M. Rizet, J. Mallevialle, and J. C. Cournarie.
Progress in Water Technology, Vol 9, No 1, p 203-215, 1977. 8 fig, 3 tab, 7 ref.

Descriptors: *Artificial recharge, *Aquifer management, *Groundwater recharge, *Water pollution, *Pit recharge, Induced infiltration, Water reuse, Water quality, Aquifers, Groundwater, Underground storage, Water analysis, Pollutants, Pilot plants, Recharge, Groundwater resources, *Seine River(France).

An artificial recharge pilot plant (1 cu m/hr) was employed to investigate the evolution of various pollutants in the charging basin and successive ground layers. The compounds were introduced separately at different concentrations: 1 mg/l of lead in the form of nitrate, 1 mg/l of sodium alkyl aryl sulfonate, 2 mg/l of a ZIEGLER synthetic alcohol (nonionic surfactant), 2.5 mg/l of phenol, 12.5 mg/l of a mixture of hydrocarbons and surfactants (soluble oil), 300 mg/l of a refinery effluent, and finally, lindane at concentrations of 1 micrograms/l and 10 micrograms/l. Specific algal and bacterial counts were made on the water in the basin as well as in the sand before and after passage of the polluting flows. A certain delay in penetration was observed for the non-biodegradable compounds, while the passage of the biodegradable compounds into the surface layer was stopped rapidly by acclimatization of the biotope. (Henley-ISWS)
W78-05374

THE APPLICATION OF A TWO-LAYER TIME-DEPENDENT MODEL TO POLLUTION ASSESSMENT AND CONTROL IN A SHORT STRATIFIED ESTUARY,
Sydney Univ. (Australia). Dept. of Chemical Engineering.
R. M. Pitblado, and R. G. H. Prince.
Progress in Water Technology, Vol. 9, No. 1, p 217-231, 1977. 4 fig, 2 tab, 17 ref, 1 append.

Descriptors: *Estuaries, *Rivers, *Tidal waters, *Model studies, *Australia, Mathematical models, Salinity, Biochemical oxygen demand, Dissolved oxygen, Tides, Tidal effects, Storm water, Storms, Saline water-freshwater interfaces, Water pollution, Stratified flow, Stratification, Stratified estuaries.

The development and application of a two-layer time -dependent model for a short stratified estuary were reported. The estuary and its tributaries were segmented into 22 sections, each section being composed of two perfectly mixed boxes representing the upper and lower layers. Salinity, BOD, and DO were predicted in every box each 20 minutes, closely following variations due to tidal flow. Comparison between two experimental runs and predictions was given. An important use of the model is to predict transient pollution levels in the estuary following a major storm. A simulation of such a storm was included, and the bulk movement of pollution seawards and from the upper to lower layer was demonstrated clearly. Several applications of the model to pollution control and enforcement were outlined, including the identification of polluting sources and loads and the design and interpretation of sampling schemes. (Sims-ISWS)
W78-05375

HYDROCHEMICAL EFFECTS OF WASTE PERCOLATION OF GROUNDWATER IN BASALT NEAR FOOTSCRAY, VICTORIA, AUSTRALIA,
Geological Survey of Victoria (Australia).
M. Riha.
Progress in Water Technology, Vol. 9, No. 1, p 249-266, 1977. 11 fig, 6 ref.

Descriptors: *Water chemistry, *Australia, *Groundwater, *Aquifers, *Waste water(Pollution), Basalts, Percolation, Sampling, Phenols, Monitoring, Wells, Quarries, Ponds, Waste disposal, Dissolved solids, Dispersion, Manganese, Hydraulic conductivity, Drawdown, Plumes.

Part of the basalt aquifer adjacent to the Stony and Kororoit creeks at West Footscray, has been polluted by percolation of phenolic wastes disposed into disused quarry holes by a large chemical industry. Chemical analyses of samples from 12 monitoring bores indicated that degraded water is moving through both the upper and lower basaltic aquifers. The plume of contaminated water, approximately 1 km wide, is believed to extend downgradient to Port Phillip at a distance of about 4.5 km. Since the installation of a new above-ground treatment plant and lined sludge pond in April 1974, the recharge mound in the quarry and disposal ponds declined, and there has been corresponding decrease in the phenol content of the aquifers. It is believed that this degraded water originates in part from former quarry holes located to the north and northeast outside the chemical industry property, which have been filled with gyp-

sum, roasted pyrites and other wastes. The physical properties of the basalt aquifer system are such that they are difficult to match to dispersion models derived from homogeneous media with intergranular porosity. Since the vertical hydraulic conductivity of the basalt aquifer is much lower than the horizontal hydraulic conductivity, the pollution of the lower aquifer is significantly lower and is controlled by the pressure head relations. (Visocky-ISWS)
W78-05376

PRELIMINARY DESIGN OF OCEAN OUTFALL AT SYDNEY: PROTECTION OF BATHING WATERS,
Caldwell Connell Engineers, Melbourne (Australia).
I. G. Wallis, T. J. Pollock, and M. W. Whyte.
Progress in Water Technology, Vol. 9, No. 1, p 267-278, 1977. 5 fig, 4 tab, 6 ref.

Descriptors: *Outfall sewers, *Pacific Ocean, *Water quality, *Australia, Coliforms, Diffusion, Bacteria, On-site investigations, Measurement, Data processing, Model studies, Mathematical model, Oceans, Currents(Water), Dye releases, Dye dispersion, Dye concentration, Water pollution, Pollutants, Path of pollutants, Oceanography.

Sewage generated in metropolitan Sydney is collected by 19 separate sewerage systems, the three largest of which discharge to the Pacific Ocean through outfalls at the base of the coastal cliff. Primary sewage treatment plants are installed at two of the outfalls, and another plant is under construction at the third of these major outfalls. The Sydney Metropolitan Water, Sewerage and Drainage Board is investigation the feasibility of ocean disposal of the plant effluents through long submarine outfalls. Extensive investigations have been carried out during the last four years in order: (1) to establish the performance of such outfalls: (2) to determine construction methods and costs; and (3) to define baseline biological and chemical conditions in the potential discharge areas. One of the many aspects considered in this feasibility study was the protection of bathing beaches in the outfall region from unacceptable bacterial contamination. It was concluded that ocean disposal of primaru treated sewage effluent through a deep-water submarine outfall of practical length can meet water quality standards for bathing areas. (Sims-ISWS)
W78-05377

TRANSVERSE MIXING IN MEANDERING CHANNELS WITH VARYING BOTTOM TOPOGRAPHY,
Canada Centre for Inland Waters, Burlington (Ontario). Hydraulics Research Div.
B. G. Krishnappan, and Y. L. Lau.
Journal of Hydraulic Research, Vol 15, No 4, p 351-371, 1977. 10 fig, 2 tab, 13 ref, 3 append.

Descriptors: *Dispersion, *Alluvial channels, *Meanders, *Sediment transport, *Geomorphology, Hydraulics, Model studies, Scour, Braiding, Methodology, *Movable bed, *Transverse mixing, Concentration distribution.

Using the theory of dimensions, it was established that the dimensionless dispersion coefficient in the transverse direction in meandering channels is a function of the friction factor, meander amplitude-ti-width ratio, and the width-to-hydraulic radius ratio. An attempt was made to establish the functional relationship by measuring the dispersion coefficients for various values of the above-mentioned parameters. The meandering channels used for this study had realistic bottom configurations which resulted from the scouring and deposition of the sand forming the bottom of the channels in contrast to the rigid bottom channels used in the previous studies. The dispersion coefficients were evaluated using the Generalized Change of Moment Method. Different assumptions for the behavior of the dispersion coefficient were tested, but non exhibited superiority over the others. A numerical method was developed to solve for the concentration distribution in a meandering channel. (Singh-ISWS)
W78-05390

NATURAL VEGETATION AS A SOURCE OF DIFFUSE SALT WITHIN THE COLORADO RIVER BASIN,
Utah State Univ., Logan. Dept. of Range Science.
A. Malekuti, and G. F. Gifford.
Water Resources Bulletin, Vol 14, No 1, p 195-205, February 1978. 8 fig, 4 ref. BLM 52500-CTS-16.

Descriptors: *Salts, *Colorado River Basin, *Ranges, *Vegetation, Leachate, Litter, Precipitation(Atmospheric), Winds, Overland flow, Gullies, Channels, Subsurface flow, Simulated rainfall, Laboratory tests, Sampling, Dissolved solids, Utah, *Diffuse salt, Channel processes, Price River basin(Utah).

Foliage and litter leachate from selected natural vegetation in the Price River Basin (within the Upper Colorado River Basin) was studied to determine the probable impact of plants on the amount of diffuse salt movement from rangeland watersheds. Calculations using concentrations of various leachates and characteristics of range sites expected to be high salt producers indicated that plants contribute between 0.01 and 0.02% or less of the total annual salt load to the Price River. Therefore, it was concluded that plants are not a significant source of diffuse salt within the Colorado River Basin. (Visocky-ISWS)
W78-05393

TRENDS OF SELECTED GROUND-WATER CONSTITUENTS FROM INFILTRATION GALLERIES, SOUTHEAST NASSAU COUNTY, NEW YORK,
Geological Survey, Mineola, NY. Water Resources Div.
D. J. Sulam, and H. F. H. Ku.
Ground Water, Vol 15, No 6, p 439-445, November-December 1977. 10 fig, 3 tab, 9 ref.

Descriptors: *Path of pollutants, *Water pollution sources, *Groundwater, *Septic tanks, *Cesspools, *New York, Chemical analysis, Water analysis, Nitrates, Chlorides, Hardness(Water), Dissolved solids, Water quality, Groundwater movement, Pollutant identification, *Long Island(NY), Water pollution trends.

Long-term records of ground-water quality indicate that in an unsewered area of southeast Nassau County, New York, certain constituent concentrations increased substantially from 1910 to 1975. Most of the increase virtually parallel the rate of population growth and number of houses that discharge waste water through cesspools and septic tanks. Data sites used for this study were two abandoned infiltration galleries in Wantagh and Massapequa that withdraw water from the shallow aquifer. Ranges in total solids, in milligrams per liter, during 1910-75 were from 51 to 249 at Wantagh, and from 54 to 228 at Massapequa. Maximum concentration occurred during the latter part of the period, when the effluents from thousands of cesspools and septic tanks were being discharged. Fertilizer use before and during the period of rapid urbanization (1941 to 1960) may also have added large amounts of certain constituents to the ground-water reservoir. Analysis of fresh-water discharge from streams an subsurface outflow to the bays south of the study area indicates that an estimated 54,800 pounds of constituent load is discharged daily. (Woodard-USGS)
W78-05420

AN ANALYSIS OF SALINITY IN STREAMS OF THE GREEN RIVER BASIN, WYOMING,
Geological Survey, Cheyenne, WY. Water Resources Div.
L. L. DeLong.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-275 728, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 77-103, September 1977. 32 p, 18 fig, 4 tab, 6 ref.

Descriptors: *Model studies, *Dissolved solids, *Streamflow, *Wyoming, *Regression analysis, *Salinity, Movement, Streams, Simulation analysis, Statistical models, Reach(Streams), Water quality, Water pollution, Path of pollutants, Pollutant identification, *Green River basin(Wyo), *Dissolved-solids transport.

Dissolved-solids concentrations and loads can be estimated for streamflow records using a regression model derived from chemical analyses of monthly samples. The model takes seasonal effects into account by the inclusion of simple-harmonic time functions. Monthly mean dissolved-solids loads simulated for a 6-year period at U.S. Geological Survey water-quality stations in the Green River basin of Wyoming agree closely with corresponding loads estimated from daily specific-conductance records. In a demonstration of uses of the model, an average gain of 114,000 tons of dissolved solids per year was estimated for a 6-year period in a 70-mile reach of the Green River from Fontenelle Reservoir to the town of Green River, including the lower 30-mile reach of the Big Sandy River. (Woodard-USGS)
W78-05439

DYNAMICS OF MANGANESE, CADMIUM AND LEAD IN EXPERIMENTAL POWER PLANT PONDS,
Bradley Univ., Peoria, IL. Dept. of Chemistry; and Bradley Univ., Peoria, IL. Dept. of Biology.
For primary bibliographic entry see Field 5A.
W78-05480

BACTERIAL ANALYSIS IN THE WATER OF THE POOLS OF MOULIN-DE-VERT, VERBOIS-GENEVA, (IN FRENCH),
Geneva Univ. (Switzerland). General Microbiology Lab.
For primary bibliographic entry see Field 5A.
W78-05482

A MATHEMATICAL MODEL OF ECOLOGICAL DISTURBANCES IN A WATER BASIN ORIGINATING UNDER THE INFLUENCE OF A SHORE POLLUTION SOURCE, (IN RUSSIAN),
Institute of Biology of the Southern Seas, Sevastopol (USSR).
V. I. Belyaev.
Okeanologiya 16(3), p 457-463, 1976.

Descriptors: *Ecological distribution, *Ecosystems, Lakes, *Mathematical models, *Shore pollution, Water pollution sources.

The reconstruction of the ecological system of a basin (sea, lake) under the influence of shore pollution is considered. The problem reduces the qualitative analysis of mathematical relationships in the ecological syst em of a basin aimed at establishing frontal concentration values and computations of the pollution components which are the leading factor.--Copyright 1977, Biological Abstracts, Inc.
W78-05495

SANITARY BACTERIOLOGICAL AND VIROLOGICAL CONTROL OF WATER BODIES, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
L. V. Grigor'Eva.
Gidrobiol Zh 12(5), p 77-80, 1976.

Descriptors: Bacteriology, *Viruses, *Bioindicators, *Microbiology, *Organic wastes, Actinomycetes, Ammonifiers, Bacilli, Bacteria, Bdellovibrio-bacteriovorus, Clostridium-perfringens, Enterococci, Indicators, Saprophytes, Staphylococci, Virological studies, Water pollution sources.

On the basis of extensive multi-year studies of marine and continental water bodies, a schematic was devised for analysis of the sanitary condition of water bodies according to certain microbiological indices. Water bodies are classified as clean, polluted or heavily polluted according to the titer of intestinal bacilli, enterococci, Clostridium perfringens and ammonifiers and the quantity of intestinal phages and aerobic saprophytes. Aerobic saprophytes serve as supplemental indices or organic pollution of water bodies and the process of self-purification. In concrete instances microbiological criteria can be supplemented by determination of microorganisms of other physiological groups (Bdellovibrio bacteriovorus, staphylococci, aerobic proteolytic bacteria, nitrifiers, actinomycetes and molds).--Copyright 1977, Biological Abstracts, Inc.
W78-05504

PESTICIDE MODES OF ENTRANCE AND CONTENT IN WATER SUPPLIES, (IN RUSSIAN),
K. K. Vrochinskii.
Gidrobiol Zh 12(5), p 93-101, 1976.

Descriptors: *Organochlorine pesticides, *DDT, *Herbicides, Pesticides, Water pollution sources, *Pesticide residues, *Path of pollutants, Water supply, Reviews, Agricultural runoff.

A review is given of the characteristics of pesticide application in agriculture as the basic mode of their entrance into open water bodies by means of surface and collector-drainage streams. In the cases of direct introduction intot the water bodies of substances used in the capacity of larvicides, ichtohocides and aqueous herbicides, high local concentrations of pesticides in water bodies were observed. Data on concentrations of organochlorine pesticides, DDT and its metabolites and organophosphorous pesticides in open water bodies of various countries is given DDT, the most invensively used the organochlorine pesticides during the past 30 yr, has a stability of 35 yr and is found in practically every water body and river studied in concentrations ranging from tens to tens of thousands of parts per mg/l. An evaluation of potential danger of pesticides for water bodies requires complex calculation of their effect on hydrochemical, hydrobiological and other processes.--Copyright 1977, Biological Abstracts, Inc.
W78-05516

DISTRIBUTION OF LEAD IN SPHAGNUM FUSCUM PROFILES IN FINLAND,
Helsinki Univ. (Finland). Dept. of Botany.
P. Pakarinen, and K. Tolonen.
Oikos, Vol 28, No 1, p 69-73, 1977. 4 fig, 13 ref.

Descriptors: *Mosses, *Lead, Bog, Peat, Leaching, Wetlands, *Distribution, Water pollution sources, *Sphagnum fuscum, *Peat profile, Mylia anomala, *Finland, Hepatic layer.

Core samples were taken from ten mires. The green portion of Sphagnum fuscum usually had lower lead contents than did dead moss a few years of age, suggesting that the moss is not actively taking up lead from organic substrate. A distinct enrichment horizon of lead found at a depth of 20-50 cm demonstrates that some leaching from surface moss occurs. Rate of leaching seems to be low for the regional pattern of lead in Sphagnum remains clear. In dead Sphagnum fuscum covered by a thin layer of Mylia anomala, two maxima of lead were present: one in the upper 0-2 cm and the second deeper in the peat. (Stihler-Mass)
W78-05521

WINTER STANDING CROP AND NUTRIENT CONTENTS IN FIVE CENTRAL NEW YORK WETLANDS,
Ithaca Coll., Dept. of Biology.
For primary bibliographic entry see Field 2H.
W78-05522

AQUATIC METABOLISM OF THE COMMUNITIES ASSOCIATED WITH ATTACHED DEAD SHOOTS OF SALT MARSH PLANTS,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 5C.
W78-05524

ONSITE CONTROL OF SEDIMENTATION UTILIZING THE MODIFIED BLOCK-CUT METHOD OF SURFACE MINING.
Kentucky Dept. of Natural Resources and Environmental Protection, Frankfort.
For primary bibliographic entry see Field 5G.
W78-05536

DEVELOPMENT STATUS AND ENVIRONMENTAL HAZARDS OF SEVERAL CANDIDATE ADVANCED ENERGY SYSTEMS,
Lockheed Missiles and Space Co., Inc., Huntsville, AL. Huntsville Research and Engineering Center.
For primary bibliographic entry see Field 5G.
W78-05538

A PRELIMINARY ASSESSMENT OF THE ENVIRONMENTAL IMPACTS FROM OIL SHALE DEVELOPMENTS,
TRW Environmental Engineering Div., Redondo Beach, CA.
For primary bibliographic entry see Field 5G.
W78-05540

FORECASTING THE COMPOSITION AND WEIGHT OF HOUSEHOLD SOLID WASTES USING INPUT-OUTPUT TECHNIQUES--AN EXECUTIVE SUMMARY,
Ebon Research Systems, Washington, DC.
D. Kidder.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 684, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA - 600/8-77-002, January 1977. 13 p, 2 fig. EPA 68-03-0261.

Descriptors: *Solid wastes, *Economic prediction, *Input-output analysis, *Forecasting, Projections, Model studies, Estimating, *Household solid waste, Economic models, INFORUM, Economic forecasting, Preding, Public administration, Materials estimates.

The feasibility of using input-output analysis (based on transactions among industries and other sectors of the economy) to estimate the volume of household solid waste for 1971 and project the future volume to 1985 was tested. The study utilized a model describing the economy in terms of materials embodied in products purchased by households and the INFORUM model extrapolation of inter-industry coefficients and production forecasts of sectoral growth. The interrelationships among (1) industries as producers and users of raw materials and semi-finished goods; and (2) industries and users (households, capital goods buryers, governments and foreign buyers) of final products are described. Path products' concepts that relate materials to long-term projection of household wastes, adjustments, and assumptions used in this model are discussed. The forecast of growth in consumer expenditures and resulting waste between 1971 and 1985 was considerable for most product categories; data are presented in tabular form. (Seip-IPA)
W78-05551

SITE SPECIFIC BURIAL OF UNFIXATED FLUE GAS SLUDGE,
Research-Cottrell, Inc., Bound Brook, NJ.
For primary bibliographic entry see Field 5E.
W78-05555

DISTRIBUTION OF OXADIAZON AND PHOSALONE IN AN AQUATIC MODEL ECOSYSTEM,
Agricultural Research Service, Beltsville, MD. Agricultural Environment Quality Inst.
For primary bibliographic entry see Field 5C.
W78-05558

DISPERSIVE SOURCES IN UNIFORM GROUND-WATER FLOW,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
B. Hunt.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 104, No. HY1, Proceedings Paper 13467, p 75-85, January 1978. 2 fig, 9 ref, 3 append.

Descriptors: *Dispersion, *Groundwater, *Uniform flow, *Water pollution sources, Water resources, Steady flow, Mathematical models, Equations, Groundwater movement, Model studies.

Solutions were given for instantaneous, continuous, and steady-state sources of pollution in uniform groundwater flow. Then the solutions were used to determine how long a continuous source must be in place before steady-state conditions are approached, to determine the effect of a finite aquifer depth upon solutions for an infinite aquifer depth, to calculate maximum concentrations for instantaneous sources, and to determine the time required for solutions for a point source and a source of finite size to approach each other. (Visocky-ISWS)
W78-05571

THE INFLUENCE OF CATION EXCHANGE AND GYPSUM SOLUBILITY ON THE TRANSPORT OF SODIUM, CALCIUM AND SULPHATE THROUGH SOILS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
For primary bibliographic entry see Field 2G.
W78-05576

THE STRATIGRAPHY AND GEOMORPHOLOGY OF THE HOFMANN FOREST POCOSIN,
Soil Conservation Service, Raleigh, NC. and North Carolina State Univ. at Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 2H.
W78-05577

NITROGEN FERTILIZER AND NITRATE CONCENTRATIONS IN TRIBUTARIES OF THE UPPER SANGAMON RIVER IN ILLINOIS,
Washington Univ., St. Louis, MO., Center for the Biology of Natural Systems.
R. Klepper.
Journal of Environmental Quality, Vol 7, No 1, p 13-22, January-March 1978. 1 fig, 9 tab, 12 ref, 1 append. NSF AEN73-07848 A03.

Descriptors: *Nitrates, *Water pollution, *Fertilizers, *Farm management, *Illinois, Regression analysis, Data processing, Farms, Streams, Tributaries, Drainage, Crops, Soybeans, Grains(Crops), Livestock, Surveys, Data collections, Pollutants, Sangamon River(Ill), Nonpoint pollution, Nitrate nitrogen.

Cross section multiple regressions were used to test the importance of nitrogen fertilizer use for variations in the nitrate nitrogen concentrations in 16 small tributaries of the Sangamon River in east

central Illinois. Data were collected and regressions were run for 2 years, 1974 and 1975. Nitrate nitrogen concentrations in the spring of each year were regressed on estimated nitrogen fertilizer use per hectare of watershed in the previous crop or calendar year and on varibles representing other aspects of agronomic practice and hydrologic features. The fertilizer data were collected by surveying approximately 300 farmers. Nitrate nitrogen concentrations were measured at 4-week intervals. The regression results are not clear-cut but lend support to nitrogen fertilizer use as an important explanatory variable for variations in nirrate nitrogen concentrations. (Sims-ISWS)
W78-05579

CHARACTERIZATION AND IMPACT OF STORMWATER RUNOFF FROM VARIOUS LAND COVER TYPES,
Wiggins-Rimer and Associates, Durham, NC.
A. E. Rimer, J. A. Nissen, and D. E. Reynolds.
Journal Water Pollution Control Federation, Vol. 50, No. 2, p 252-264, February 1978. 7 fig, 7 tab. EPA PO-04099-01-4.

Descriptors: *Storm runoff, *Water quality, *Monitoring, *Land use, *North Carolina, Sampling, Streams, Pollutants, Water pollution, Dissolved oxygen, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Nitrogen, Phosphorus, Heavy metals, Runoff, Storms, Streams, Streamflow, Hydrography, Water pollution sources, Nonpoint pollution sources.

The potential significance of nonpoint pollution sources on water quality in streams is a factor that can no longer be ignored. This philosophy is being emphasized currently by the Environmental Protection Agency in its 208 areawide water quality management program. In conjunction with these efforts, a water quality sampling and monitoring program was implemented in the Research Triangle region of North Carolina. To analyze the relationship between land cover and runoff quality under varying storm conditions, automatic samplers were located on seven streams that drained areas of specific land cover types; four samplers were placed at locations of various land use; and six continuous water quality monitors were located on major receiving streams. The resultant hydrographs and pollutographs were presented according to the type of land cover being studied and correlated with stream quality. (Sims-ISWS)
W78-05580

A MULTIDIMENSIONAL ANALYSIS OF THE RESULTS OF THE FRENCH 1971 SURFACE WATER QUALITY NETWORK CONTROL IN THE RIVER BASIN 'SEINE-NORMANDIE',
Ecole Nationale Superieure des Mines de Paris, Fontainebleau (France). Center for Geological Information.
For primary bibliographic entry see Field 5A.
W78-05581

VARIABLE THICKNESS TRANSIENT GROUNDWATER FLOW MODEL THEORY AND NUMERICAL IMPLEMENTATION,
Battelle Pacific Northwest Labs., Richland, WA.
For primary bibliographic entry see Field 2F.
W78-05584

ASPECTS OF THE RELATIONSHIP BETWEEN TEMPERATURE AND AQUATIC CHEMISTRY,
Miami Univ., Coral Gables, FL. Lab. for Water Research.
For primary bibliographic entry see Field 5C.
W78-05588

SALT WATER INTRUSION IN THE UNITED STATES,
Robert S. Kerr Environmental Research Lab., Ada, OK.
B. D. Newport.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 897, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-600/8-77-011, July 1977. 31 p, 8 fig, 1 tab, 37 ref.

Descriptors: *Saline water intrusion, *Groundwater, *Salts, Hydraulic systems, Coastal structures, Wells, Irrigation, Pumping, United States, Underground, Pollutant identification, Aquifer testing, Aquifer management, *Water pollution sources, Water pollution control.

Salt water intrusion, from one or more sources outlined (including hydraulic connection with ocean or brackish waters of estuaries, improper disposal of field brines, surface infiltration, salt water in limestone formations, irrigation return flow, and excessive pumping), has resulted in degradation of subsurface fresh water aquifers in 43 states of the U.S. Waste from municipal and industrial sources entering natural streams or reservoirs are responsible for the more visible types of pollution; their detection is rapid, their source(s) can usually be identified, and their elimination will result in rapid natural improvement of water quality. In contrast, the clandestine movement of salt water through a fresh water aquifer continues, defying early detection, concealing its origin(s), and creating long-term problems with expensive remedies. Current control options include reducing pumping, relocating wells (inland and/or dispersed), recharging aquifers, recharging fresh water into wells to form an hydraulic barrier, creating a trough parallel to the coast by evacuating encroaching salt water from wells, drilling scavenger wells to evacuate salt water, eliminating and regulating surface and subsurface disposal from oil fields, locating and plugging faulty wells, and eliminating and preventing surface infiltration sources. Early detection of salt water intrusion into potable aquifers is identified as an area needing additional research. (Wares-IPA)
W78-05613

FEASIBILITY OF SILVER-LEAD MINE WASTE MANIPULATION FOR MINE DRAINAGE CONTROL.
Montana Dept. of Natural Resources and Conservation, Helena. Engineering Bureau.
For primary bibliographic entry see Field 5G.
W78-05614

MINE DRAINAGE CONTROL FROM METAL MINES IN A SUBALPINE ENVIRONMENT: A FEASIBILITY STUDY.
Montana Dept. of Natural Resources and Conservation, Helena. Engineering Bureau.
For primary bibliographic entry see Field 5G.
W78-05618

DRINKING WATER SYSTEMS FOR THE TRAVELING PUBLIC: A STATUS REPORT.
Environmental Protection Agency, Washington, DC. Office of Water Supply.
For primary bibliographic entry see Field 5F.
W78-05623

TRANSPORT AND TRANSFER RATES IN THE WATERS OF THE CONTINENTAL SHELF,
Lamont-Doherty Geological Observatory, Palisades, NY.
P. E. Biscaye, W. S. Broecker, H. W. Feely, and R. D. Gerard.
Available from the National Technical Information Service, Springfield, VA 22161 as COO-2185-7, Price codes: A08 in paper copy, A01 in microfiche. Energy Research and Development Administration, April 1976. 139 p, 5 append. E(11-1)2185.

Descriptors: *Mixing, *Continental shelf, *Path of pollutants, Baseline studies, Dispersion, Water pollution effects, *Outer continental shelf, *New York Bight.

Understanding the chemical, physical and biological processes which control the origin, dispersal and fate of particulate matter, and to ultimately model the impact of energy related pollutants on the continental shelf is the goal of this research. The report is divided into four sections: (1) a general introduction; (2) spreading of water characteristics and species in solution; (3) mixing and dispersal of solids and trace metals; and (4) mixing of species across, within and out of sediments. Each section has its own introductory statement followed by a report on field work accomplished, analyses done and results of findings to-date. Finally, a list of papers published, in press or in preparation and talks given during the 1975-1976 funding period is given. (Sinha-OEIS)
W78-05627

THE INTERACTION OF OIL WITH SEA ICE IN THE ARCTIC OCEAN,
Washington Univ., Seattle. Dept. of Oceanography.
S. Martin.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 16. Hazards, p 87-150, March 1977. 29 fig, 7 ref. 03-5-022-67.

Descriptors: *Oil pollution, *Sea ice, *Ice-water interfaces, Baseline studies, Resources development, *Hazards, Arctic Ocean, Alaska, *Outer Continental Shelf, Beaufort Sea, Petroleum, Offshore operations.

The types of first-year ice which occur in the Beaufort Sea and the way in which they interact with petroleum over a growing season is discussed. Because the specific gravity of petroleum is generally less than that of sea water, oil floats on water, and oil released under ice generally floats to the ice-water interface. From the NORCOR field experiment, it is known that if brine channels are present in the ice, oil rises up through the ice channels, then spreads out both on and within the ice surface. Therefore, the properties of the top layer of the ice will determine whether the oil once it reaches the surface will either spread out over the surface as over a glass sheet, or be absorbed within the ice. Most of the data consists of photographs of ice cores. The different kinds of ice which were observed in OCS field traverses are discussed and it is shown how the ice properties change over a growing season. The results from the NORCOR experiment are interpreted. (See also W78-05221) (Sinha-OEIS)
W78-05629

DYNAMICS OF NEAR SHORE ICE,
Washington Univ., Seattle. Div. of Marine Resources.
N. Untersteiner, and M. D. Coon.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 16. Hazards, p 164-332, March 1977. 3 append. 03-50-022-67(5).

Descriptors: *Sea ice, *Remote sensing, *Oil spills, *Baseline studies, *Environmental effects, *Arctic Ocean, Tracking techniques, Winds, Stress analysis, Operations, Oil industry, Hazards, Path of pollutants, *Outer Continental Shelf, *Trajectories, Kinematics, Beaufort Sea, Chukchi Sea, Offshore operations, Petroleum development.

The objective of the field program was to determine the kinematics of the ice in the Beaufort and Chukchi Seas by satellite tracking of data buoys. The data from the 20 buoys deployed and analyzed show that this is a reliable and economical way of determining the trajectories of sea ice. During most of the year oil spilled in the Arctic will be trapped in sea ice and subsequently transported by

it. These trajectories being developed by the tracking of data buoys will be the baseline information needed to judge how pollutants delivered to the ice will be transported. From the analysis of OCS data and the related data from AIDJEX, it appears that during much of the summer the trajectories of ice could be computed from a knowledge of wind conditions only. However, during extended periods in fall, winter and spring the trajectories are influenced by the condition of the pack ice and its internal stress. Model calculations indicate that ice velocities can be determined from the AIDJEX ice model when high quality wind data are available, together with some buoy positions to provide boundary conditions for the calculations. The model calculations provide information about the stress transmitted through the pack ice. Because it is likely that these ice stresses and severe ice conditions can be the cause of oil spills, the knowledge of ice conditions and ice stress will be important in determining times and locations for safe operations. (See also W78-05221) (Sinha-OEIS)
W78-05631

POLLUTION FROM DREDGING OPERATIONS,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
L. K. Wang, R. P. Leonard, and P. M. Terlecky, Jr.
Report No. 3-15-75, March, 1975. 16 p, 4 fig, 4 tab, 2 ref.

Descriptors: *Dredging, *Sediments, *Water pollution sources, Water pollution control, Water quality standards, Lake Erie, Ohio, Water pollution, *Dredging pollutants, *Dredging pollutants, *Dredging spoils, Sediment settling, *Dike disposal area, Dredging detention, Dredging disposal, Great Lakes Water Standards, Supernatent discharge, Ashtabula River, Grand River, Fairport Harbor.

The main features and operation methods of four types of dredges: the clamshell, dipper, pipeline, and hopper dredges are described. Sources of pollution in waterway sediments from dredging operations including (1) point pollution sources such as municipal and industrial discharges, (2) non-point sources such as storm runoff, agricultural runoff, soil erosion, and (3) random accidental spills are discussed. The results of sediment characterization studies of dredging spoils from Ashtabula and Fairport Harbors in Ohio are reported and contrasted. Investigation of sediment settleability and the effectiveness of adequate detention time of dredgings in a diked disposal area before discharge of supernatant back to the receiving stream or lake indicates that removal of heavy metals, oil, grease, and phosphorous is significant at only 1 hour settling time and is greater than 95% after 18 hours settling. Potential for use of dredged materials in land fill and land reclamation, and disposal of dredgings in along-shore and offshore diked areas and abandoned strip mine areas is briefly discussed. Tentative water quality criteria of treated sediment and water for Ashtabula River, Grand River and Lake Erie are presented. From settleability data, it is concluded that sufficient settling of dredgings in a diked disposal area followed by discharge of supernatant to Great Lakes water will not contravene proposed Great Lake Water Standards. Settling test data, pollutant content in dredged materials, and water quality, criteria are presented in tables. (Seip-IPA)
W78-05673

STATE-OF-THE-ART: MILITARY EXPLOSIVES AND PROPELLANTS PRODUCTION INDUSTRY, VOL. I - THE MILITARY EXPLOSIVES AND PROPELLANTS PRODUCTION INDUSTRY,
American Defense Preparedness Association, Washington, DC.
J. Patterson, N. I. Shepira, J. Brown, W. Duckert, and J. Polson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 385, Price codes: A06 in paper copy, A01 in microfiche. EPA Report No 600/2-76-213a, October, 1976. Vol I of III, 96 p, 18 fig, 3 tab. R802872.

Descriptors: *Explosives, *Waste water treatment, *Pollutant identification, *Water pollution control, *Water pollution sources, Nitrates, Acids, *Propellants, Nitrating acids, Nitric acid, Sulfuric acid, Oleum, Acetic acid, Acetic anhydride, Ammonium nitrate, Load/Assembler/Pack(LAP), Red water, Trinitrotoluene(TNT), Tetryl, RDX/HMX, Nitrocellulose, Nitroglycerine.

Wastewater effluents of the military explosives and propellants manufacturing industry are investigated. New wastewater treatment technologies are outlined for cross-flow filtration, evaporative dewatering, catalyzed ozonation, reverse osmosis, use of powdered activated carbon, wastewater extraction, and ion exchange. The major steps in the manufacture of munitions are described. The essential process involved in the production of the major explosive and propellant chemicals and their assembly into end-item munitions are described for trinitrotoluene (TNT), tetryl, cyclotrimethylenetrinitramine/cyclotetramethylenetrinitramine (RDX/HMX), nitrocellulose, nitroglycerine, nitrocellulose-base propellants, ball powder, and black powder. Nitrating acid manufacture is outlined for nitric acid, sulfuric acid, oleum, acetic acid, acetic anhydride, and ammonium nitrate. Loading of explosives or propellants into field hardware is described. Approaches to water pollution abatement, such as manufacturing improvements water management, and outfall treatment, are briefly discussed. Water pollutants resulting from basic explosive and acid manufacture, the compounding of explosives and propellants, and loading procedures are described. Acid drippings, solvent spills, rust, stack scrubber drainings, floor washdown wastewater, 'red water' from TNT purification, and water solutions of various explosives contribute to the pollution problems. General conclusions and recommendations are reported. Subsequent volumes present the bulk of the wastewater treatment, sampling, and monitoring data and evaluate current and new treatment processes. (Seip-IPA)
W78-05684

MODEL STUDIES OF OUTFALL SYSTEMS FOR DESALINATION PLANTS. PART I, FLUME STUDY OF THE MIXING CHARACTERISTICS OF DENSE JETS DISCHARGED INTO A FLOWING FLUID, VOL I, MAIN TEXT. APPENDIX A: NOTATION. APPENDIX B: CONDUCTIVITY PROBE CALIBRATION AND DATA REDUCTION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
F. M. Holly, Jr., and J. L. Grace, Jr.
Available from National Technical Information Service, Springfield, VA 22161 as ADA-032 703, Price codes: A04 in paper copy, A01 in microfiche. Research Report H-71-2, August, 1971. part I of II, 57 p, 17 fig, 3 tab, 16 ref, 2 append. 14-30-2656.

Descriptors: *Desalination wastes, *Brine disposal, *Brines, *Dispersion, *Model studies, Waste dilution, Flumes, Outlets, Estuaries, Ocean circulation, Discharge measurement, Efficiencies, *Brine plumes, Effluent jet discharge, Brine dispersion, *Plume spread, Effluent diffuser system, Brine dilutions, *Dispersion rates, Equilibrium distribution, Discharge velocity, Single-port diffuser, Multiple-port diffuser.

A physical model was utilized to evaluate the degree of mixing attainable through the use of desalination plant effluent-diffusers located on an estuary or ocean floor beyond the surf zone, from which dense brine is discharged vertically through circular ports into a uniform and steady crosscurrent. Nearly 400 tests were run in a 1:20 scale, uniform-flow, level-bottom flume to evaluate the effects of port diameter, brine flow rate, density difference between brine and ambient fluid, and ambient fluid velocity on the geometry and mixing characteristics of brine discharged through a single-port diffuse. Geometry data were taken through photographic and visual observations; dilution data were compiled using combined conductivity-temperature probes. The product of the ratio of ambient to port velocities and a port densimetric Froude number has been found to be the significant parameter in all aspects of the problem. Equations are presented for the calculation of the upper boundary of a jet, the prediction of the maximum effluent concentrations to be expected for a given set of design/operating parameters and the prediction of plume spread. Tests using a multiple-port diffuser verified that linear superposition of single-port results can be used to predict multiple mixing characteristics. Tests using heated brine indicate that the presence of a temperature differential of up to 10C between the brine and ambient fluid has no significant effect on the plume mixing characteristics. A multiple-port diffuser was found to have a significant advantage over a simple outfall pipe in keeping high concentrations of dissolved metallic ions away from the ocean floor. (See also W78-05690) (Seip-IPA)
W78-05689

MODEL STUDIES OF OUTFALL SYSTEMS FOR DESALINATION PLANTS, PART II. TESTS OF EFFLUENT DISPERSION IN SELECTED ESTUARY MODELS, VOLUME I. MAIN TEXT,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
W. H. Bobb, R. A. Boland, Jr., and F. A. Herrmann.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-032 710, Price codes: A09 in paper copy, A01 in microfiche. Research Report H-71-2, September, 1971. Part II of II, 183 p, 169 fig. 14-30-2656.

Descriptors: *Desalination wastes, *Bine disposal, *Brines, *Dispersion, *Equilibrium, Freshwater, Outlets, Estuaries, Delaware River, Effluent jet discharge, Jet mixing, Brine dispersion, Effluent diffuser system, Freshwater inflow, Effluent buoyancy, Dispersion rates, *Effluent mixing, Equilibrium distribution, *San Diego Bay, *Galveston Bay.

The dispersion of heated waste brine from desalination plant outfalls, the dynamic equilibrium distribution of the waste after sustained plant operation, and the effects of freshwater inflow on dispersion rates and equilibrium values were studied. The comprehensive fixed-bed models of San Diego Bay, Galveston Bay, and Delaware River located at the Waterways Experiment Station, are typical of estuaries on which salt-water conversior facilities are frequently located; therefore, test results can be applied to other similar estuaries. Heated effluent from 10-million gallon per day (mgd) plant models was introduced into the water. In estuaries such as San Diego Bay, where minimal tidal current velocities and fresh water discharge exist, dispersion and flushing rates are slow and the time required to reach dynamic equilibrium is long. In large, shallow bays such as Galveston Bay, outfall sites must be chosen carefully since flow conditions in the immedate vicinity of the diffuser significantly impact overall dispersion rates and may trap plant effluent. In estuaries such as the Delaware River, having large freshwater discharge and tidal currents and a reasonably regular shape, sufficient mixing and dispersion of the effluent will probably occur after the energy of the jet leaving the diffuse is expended. The mixing and dispersion rates in estuarines similar to the Delaware River vary directly with total freshwater flow into the estua-

ry, while the time to reach dynamic equilibrium varies inversely with total freshwater flow. Test results and data are presented in figures. (See also W78-05689) (Seip-IPA)
W78-05690

5C. Effects Of Pollution

INFECTIOUS HEMATOPOIETIC NECROSIS OF RAINBOW TROUT IN MONTANA: A CASE REPORT,
National Fish Hatchery, Hagerman, ID.
J. E. Holway, and C. E. Smith.
J Wildl Dis. 9(4), p 287-290, 1973.

Descriptors: *Hematopoietic necrosis, *Montana, *Rainbow trout, Trout, *Viruses, Fish diseases, Fish hatcheries, Water pollution effects.

Infectious hematopoietic necrosis was diagnosed in rainbow fingerlings (Salmo gairdneri kamloops) during an epizootic at a hatchery in Montana. Microscopic pathology and effects of the causative virus in cell culture are described.--Copyright 1974, Biological Abstracts, Inc.
W78-05204

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME V. RECEPTORS--BIRDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05210

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME VI. RECEPTORS--FISH, LITTORAL, BENTHOS,
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05211

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME VII. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05212

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME VIII. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05213

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME IX. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05214

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME X. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05215

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XI. RECEPTORS--MICROBIOLOGY.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05216

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XII. EFFECTS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05217

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF VOLUME XIII. CONTAMINANT BASELINES.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05218

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XVI. HAZARDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05221

PROCESSES OF CARBON DIOXIDE FLUX IN THE FANNING ISLAND LAGOON,
Hawaii Inst. of Marine Biology, Honolulu.
For primary bibliographic entry see Field 5B.
W78-05229

MATHEMATICAL MODELLING OF LIMNIC ECOSYSTEMS WITH RECURSIVE ESTIMATION METHODS, (IN GERMAN),
For primary bibliographic entry see Field 2H.
W78-05237

SANITARY-TOXICOLOGICAL ASSESSMENT OF THE CAPROLACTAM PRODUCTION EFFLUENTS TREATED IN BIOLOGICAL INSTALLATIONS, (IN RUSSIAN),
Kemerovo State Medical Inst. (USSR).
V. P. Kovtun.
Gig Sanit 8, p 15-19, 1976.

Descriptors: Biological studies, *Caprolactam, *Effluents, Water pollution, *Toxicity, Aeration, Waste water treatment, Rodents.

Sanitary-toxicological investigations of the caprolactam production effluents that were treated in aerotanks, consisting of mixers with regenerators, showed the effluents to be highly toxic for albino mice. The existing system of decontamination does not provide the necessary hygienic effectiveness. The discharge of these treated effluents into a water body may deteriorate water quality.--Copyright 1977, Biological Abstracts, Inc.
W78-05248

PROCEEDINGS OF THE CONFERENCE ON ASSESSING THE EFFECTS OF POWER-PLANT-INDUCED MORTALITY ON FISH POPULATIONS.
Energy Research and Development Administration, Oak Ridge, TN.; and Oak Ridge National Lab., TN.
CONF-770501. Proceedings of a Conference held at the Riverside Motor Lodge, Gatlinburg, Tennessee, May 3-6, 1977. Van Winkle, W. (Ed.) 365 p. W-7405-eng-26.

Descriptors: *Conferences, *Powerplants, *Environmental effects, *Life history studies, *Fish mortality, *Monitoring, *Model studies, *Fish populations.

The conference was sponsored by th U. S. Energy Research and Development Administration (Division of Biomedical and Environmental Research) and Electric Power Research Institute. The proceedings contains 20 papers pertaining to the subject of the conference. Subjects covered in these papers are case histories; estimating abundance, production, and mortality rates of young fish; compensation and stock-recruitment relationships; monitoring programs and data analysis; and the use of population models. (See W78-05252 thru W78-05268) (Chilton-ORNL)
W78-05251

DENSITY DEPENDENCE, DENSITY INDEPENDENCE, AND RECRUITMENT IN THE AMERICAN SHAD (ALOSA SAPIDISSIMA) POPULATION OF THE CONNECTICUT RIVER,
McGill Univ., (Montreal). Dept. of Biology.
W. C. Leggett.
CONF-770501, In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 3-17, 6 fig, 1 tab, 19 ref.

Descriptors: *Environmental effects, Population, Density, Fish, *Connecticut River, Mortality, Eggs, Larvae, Growth rates, Juveniles, Adult growth stage, Temperature, River flow, Forecasting, American shad, Density-dependence, Density-independence, Egg-to-adult survival, Recruitment.

Investigation showed that in the Holyoke-Turners Falls area of the Connecticut River, where the size of the spawning stock has increased dramatically since 1955, bot egg-to-adult survival rates and juvenile growth rates have shown a strong negative correlation with stock size. In the population of the river as a whole, egg-to-adult survival was estimated to be 0.00056% at replacement levels, and 0.00083% at the point of maximum population growth. Density-independent mortality was also shown to be an important regulator of juvenile year-class strength and of recruitment. Annual deviations from predicted recruitment were large and the causes of these deviations are poorly understood. Temperature and flow regimes during spawning and early development were involved. It was suggested that inspite of the availability of a strong data base, the potential for error in numerical prediction of the effects of proposed levels of increased mortality on pre-recruit is large, while the biologically acceptable range of error is small. (See also W78-05251) (Chilton-ORNL)
W78-05252

SOME FACTORS REGULATING THE STRIPED BASS POPULATION IN THE SACRAMENTO-SAN JOAQUIN ESTUARY, CALIFORNIA,
California State Dept. of Fish and Game, Stockton.
H. K. Chadwick, D. E. Stevens, and L. W. Miller.
CONF-770501, In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 18-35, 8 fig, 1 tab, 17 ref. Dingell-Johnson, Calif. F-9-R.

Descriptors: *Environmental effects, Population, Density, Fish, Striped bass, Estuaries, Flow, Power plants, Mortality, *Sacramento-San Joaquin Estuary(Calif).

The measurements of young striped bass abundance and of adult recruitment indicate that the principal variations in survival occur within about the first two months of life. These variations are correlated with, and apparently largely controlled by, the magnitude of water diversions from the estuary and magnitude of delta outflow. Diversions act as a density-independent source of mortality in regulating population size. Delta outflow controls the transport of young bass to suitable nursery areas which, in turn, influences survival through factors such as food availability. At the two electrical generating power plants in the Sacramento-San Joaquin Estuary, mortality of entrained bass was 10% or less for many conditions and approached 100% only at temperatures of 30C or more. Inpingement was insignificant at these two power plants. (See also W78-05251) (Chilton-ORNL)
W78-05253

MAN'S IMPACT ON THE COLUMBIA RIVER STOCKS OF SALMON,
Washington Univ., Seattle. Fisheries Research Inst.
E. O. Salo, and Q. J. Stober.
CONF-770501, In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977, p 36-45, 5 fig, 6 ref.

Descriptors: *Environmental effects, *Powerplants, *Columbia River, *Salmon, Management, Fish management, Spawning, Productivity.

Investigation of the effects of the impacts on Columbia River salmon stocks shows that the effect has increased with the addition of each new dam on the river, while the resiliency of the species has declined. Changes in the environment have reduced productivity of salmon until recruitment (in terms of spawners) has fallen below replacement. The upriver salmon is in a tenuous condition, and it is doubtful that all combined mitigative efforts can ensure the survival of these stocks. Efforts to mitigate impacts on lower-river stocks appear likely to succeed. A policy of zero impact for all new developments has been adopted. (See also W78-05251) (Chilton-ORNL)
W78-05254

POPULATION DYNAMICS OF YOUNG-OF-THE-YEAR FISH IN A RESERVOIR RECEIVING HEATED EFFLUENT,
Fish and Wildlife Service, Clemson, SC. Southeast Reservoir Investigations.
R. Ruelle, W. Lorenzen, and J. Oliver.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 46-67, 3 fig, 8 tab, 19 ref.

Descriptors: *Environmental effects, *Water pollution, *Thermal pollution, Reservoirs, Fish, Temperature, Populations, Nuclear powerplants, Powerplants, Sunfishes, Yellow perch, Crappie, Shad.

This paper describes the limnetic young-of-the-year fish population in Keowee Reservoir, South Carolina, before and after discharge of heated water from a nuclear power plant. After the plant went into operation the reservoir reached higher temperatures, warmed earlier in the spring, remained warm later in the fall, and the thermocline sank at an accelerated rate during the summer. Relative abundance of the young of three endemic forms (yellow perch, black crappie, and sunfishes) declined during the time of the sutyd. Reduced numbers were measured in all areas of the reservoir, but were greatest in areas closest to the heated water discharge. Numbers of an introduced species (threadfin shad) changed little during the time of the study. It was suggested that the decline in abundance of young fish might be due to temperature avoidance of adults in areas were higher temperatures existed which contributed to reduced spawning and young in the area. Determining the causes of reduced numbers of yound was confounded by possible reduction normally associated with the aging of a reservoir. (See also W78-05251) (Chilton-ORNL)
W78-05255

ESTIMATING THE SIZE OF JUVENILE FISH POPULATIONS IN SOUTHEASTERN COASTAL-PLAIN ESTUARIES,
National Marine Fisheries Service, Beaufort, NC. Beaufort Lab.
M. A. Kjelson.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 71-89, 1 fig, 4 tab, 62 ref.

Descriptors: *Management, *Fish populations, *Forecasting, Sampling, Estuaries, *Coastal plains, *Estimating, *Southeast US.

The objective of this paper is to provide information for evaluating and planning of sampling programs designed to obtain accurate and precise estimates of fish abundance. Several basic methods for obtaining absolute abundance of fish populations are discussed. These include the area-density, mark-recapture, and direct-count methods. The area-density method is recommended as being the more feasible of the three. An important decision in the use of this method is the choice of an appropriate sampling gear relative to the species of fish, the nursery habitat involved, and the budgetary limitations. Blockage methods, encircling devices, drop nets, lift nets, trawls and seines are discussed. The obtaining of sufficient number of samples and the assessing of gear catch efficiencies to improve accuracy are of high value. Cooperative effort between several interested organizations is suggested. (See also W78-05251) (Chilton-ORNL)
W78-05256

STRIPED BASS (MORONE SAXATILIS) MONITORING TECHNIQUES IN THE SACRAMENTO-SAN JOAQUIN ESTUARY,
California State Dept. of Fish and Game, Stockton.
D. E. Stevens.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 90-108, 6 fig, 33 ref. Dingell-Johnson, Calif. F-9-R.

Descriptors: Populations, *Monitoring, Density, *Striped bass, Estuaries, *Sacramento-San Joaquin Estuary, Sampling, Estimating, Fish populations.

Egg and larva surveys with plankton nets in spring were found to provide the best descriptions of where and when bass spawn but these surveys tend to underestimate standing crops of eggs. Estimates of larva mortality rates do not explain annual abundance differences measured by the summer tow-net survey. Abundance-flow correlations indicate that when spring and summer flows are low or moderate, young bass abundance is indexed effectively by annual, summer tow-net survey. At high flows, this survey underestimates abundance. A midwater trawl satisfactorily measures abundance of young bass in the fall but not in the winter. Catch-per-unit-effort data for sport-fishing party boats effectively monitored two-year-olds until 1956 when a change in angling regulations increased recruitment age from two to three years. The Petersen method and indices from party-boat catches are said to be the best monitoring techniques for bass three years old and older. Party-boat catches and postcard surveys are useful in monitoring long-term catch trends. (See also W78-05251) (Chilton-ORNL)
W78-05257

STRIPED BASS ICHTHYOPLANKTON ABUNDANCE, MORTALITY, AND PRODUCTION ESTIMATION FOR THE POTOMAC RIVER POPULATION,
Martin Marietta Corp., Baltimore, MD. Environmental Technology Center.
T. T. Polgar.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 109-125, 3 tab, 13 ref. 18-74-04(75).

Descriptors: Populations, Density, *Striped bass, *Potomac River, Monitoring, Model studies, Estimating, Mortality, Production, Plankton, *Ichthyoplankton.

Ichthyoplankton surveys were carried out as part of the Maryland Power Plant Siting Program. Age-dependent models were developed which used the field survey data for estimating mortality rate and production for each successive ichthyoplankton stage. The model assumes either a uniform age distribution or an exponential age distribution within each stage. Under the assumption of uniform age distribution, undersampling of any stage affected the population parameters of that stage and the immediately preceding stage. Under the assumption of exponential age distribution, undersampling of a particular stage affected the population parameters of that stage and all preceding stages. (See also W78-05251) (Chilton-ORNL)
W78-05258

AN ARGUMENT SUPPORTING THE REALITY OF COMPENSATION IN FISH POPULATIONS AND A PLEA TO LET THEM EXERCISE IT,
Michigan Univ., Ann Arbor. School of Natural Resources.
J. T. McFadden.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 153-183, 4 fig, 2 tab, 88 ref.

Descriptors: *Environmental effects, Populations, Density, Powerplants, Fish, *Compensation, Exploitation, Fisheries, Fish management.

Processes which reduce population growth at high densities and increase growth at low densities are compensatory. This paper presents a general case argument for the general operation of compensation in animal populations. It supports the view that compensation is operative in fish populations with three lines of evidence: the historical development of the concept is traced through its applications in fishery management, and the present day consenus held by the world's leading fishery scientists is summarized; a selection of compensatory mechanisms which operate in fish populations is reviewed; and a large number of cases, in which substantial levels of exploitation by fisheries have been sustained by fish populations without serious depletion, are cited. The applicability of fishery exploitation principles to power plant impacts is discussed. (See also W78-05251) (Chilton-ORNL)
W78-05259

ASSESSING THE IMPACT OF POWER PLANT MORTALITY ON THE COMPENSATORY RESERVE OF FISH POPULATIONS,
National Power Plant Team, Ann Arbor, MI. Office of Biological Services.

C. P. Goodyear.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 185-194, 4 fig, 1 tab, 5 ref.

Descriptors: Environmental effects, *Powerplants, *Mortality(Fish), Populations, *Compensation, Exploitation, Density, *Striped bass, Model studies, Population dynamics.

Compensation is defined as the sum of all density-dependent phenomena that act to stabilize the population. A technique designed to quantify the degree to which compensatory phenomena are exerted in exploited populations is used to examine the impact of power plant mortality on a hypothetical striped bass population. It was found that power plant mortality had a more severe impact on the compensation ratio and compensatory reserve for an exploited stock than for an unexploited stock. (See also W78-05251) (Chilton-ORNL)
W78-05260

DEVELOPMENT OF A STOCK-PROGENY MODEL FOR ASSESSING POWER PLANT EFFECTS ON FISH POPULATIONS,
Oak Ridge National Lab., TN. Environmental Sciences Div.
S. W. Christensen, D. L. DeAngelis, and A. G. Clark.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 195-225, 7 fig, 10 tab, 1 append, 22 ref.

Descriptors: *Environmental effects, *Model studies, *Fish populations, Density, Compensation, Mathematical models.

The model is a multi-age-class model based on general biological principles. The application of the model is intentionally results oriented in the sense that it was forced to assume a variety of arbitrary stock-progeny relationships. For each set of parameters which produced a desired form of relationship, the impact factor was evaluated at one or more levels of impact. The impact factor is a measure of the sensitivity of the stock to power plant cropping and, generally, is positively related to the slope at the equilibrium point and to a lesser extent is negatively related to the slope at origin. The timing of cropping in relationship to compensation is important in determining the impact factor. For a wide range of stock-progeny relationships, power plant cropping in the model always acts to decrease, and never to increase, the equilibrium stock size from its unimpacted value. The maximum amount of power-plant-induced mortality that can be tolerated by the stock can be calculated from the slope of the curve at the origin. (See also W78-05251) (Chilton-ORNL)
W78-05261

QUALITY OF INFERENCE CONCERNING THE EFFECTS OF NUCLEAR POWER PLANTS ON THE ENVIRONMENT,
Washington Univ., Seattle. Center for Quantitative Science in Forestry, Fisheries and Wildlife.
D. A. McCaughran.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 229-242, 9 fig, 1 tab, 3 ref.

Descriptors: *Environmental effects, *Nuclear powerplants, Monitoring, Designs, Powerplants, Analysis of variance, Detectable differences.

The study presented deals with minimum detectable differences in the environment and the probability of detection in several experimental designs. The relationships of cost and detectable change is discussed. Presently, analysis of variance is the most common statistical procedure applied to nuclear power plant monitoring data. Relationships between station number, replicate number, variance, and minumum detectable difference with power = 0.90 and alpha = 0.10 for phytoplankton, zooplankton, smelt, and alewives at the Zion Nuclear Power Plant are given. It is recommended that the regulatory agencies should make a concerted effort in defining unacceptable environmental change and insist upon monitoring studies capable of detecting such changes. (See also W78-05251) (Chilton-ORNL)
W78-05262

FACTORS TO CONSIDER IN MONITORING PROGRAMS SUGGESTED BY STATISTICAL ANALYSIS OF AVAILABLE DATA,
Battelle Pacific Northwest Labs., Richland, WA.
J. M. Thomas.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 243-255, 1 fig, 1 tab, 15 ref.

Descriptors: *Environmental effects, *Nuclear powerplants, *Monitoring, Statistical methods, Power, Sampling, Designs.

The purpose of this paper is to outline past experience and to suggest what might be done to assess environmental changes induced by nuclear power plants. Desirable changes in emphasis on what to measure and how to conduct the field work (including a stopping rule), quantitative issues which impinge on the choice of field designs, suggestions for methods of statistical analysis, and estimation of sample sizes necessary to detect changes in population numbers based on evaluated data are discussed. (See also W78-05251) (Chilton-ORNL)
W78-05263

ESTIMATION OF AGE STRUCTURE OF FISH POPULATIONS FROM LENGTH-FREQUENCY DATA,
Oak Ridge National Lab., TN. Environmental Sciences Div.
K. D. Kumar, and S. M. Adams.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 256-281, 8 fig, 9 tab, 23 ref.

Descriptors: *Model studies, Fish populations, Simulation analysis, Length, Age, Probability, Channel catfish, Sunfishes, Age-length key, Age structure, Probability model.

The model presented demonstrates that when the age-length key is available, maximum-likelihood estimates of the age structure of a fish population can be obtained. In the event that the key is not available, approximate estimates of the age structure can be obtained. Use of the model for determination of the age structure of channel catfish and white crappie populations is demonstrated. (See also W78-05251) (Chilton-ORNL)
W78-05264

PREDICTION OF FISH BIOMASS, HARVEST, AND PREY-PREDATOR RELATIONS IN RESERVOIRS,
Bureau of Sport Fisheries and Wildlife, Fayetteville, NC. National Reservoir Research.
R. M. Jenkins.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 282-293, 10 fig, 13 ref.

Descriptors: *Environmental effects, *Powerplants, *Model studies, Populations, Reservoirs, Fish, Prey, Predator, Standing crop, Fish harvest, Dissolved solids.

Methods of estimating fish crop and production which can be used to provide indexes to average reservoir conditions and to help identify perturbed environments are presented. Regression analyses of the effect dissolved solids on fish standing crops in 166 reservoirs produced formulas with coefficients of determination of 0.63 to 0.81. It was concluded that long-term monitoring of reservoir fish populations will be required to identify changes which can be positively attributed to power plant effects. The indexes of fish crop and harvest presented are recommended as the current best estimators and their use is urged until better models can be developed. (See also W78-05251) (Chilton-ORNL)
W78-05265

EFFECTS OF POWER STATION MORTALITY ON FISH POPULATION STABILITY IN RELATIONSHIP TO LIFE HISTORY STRATEGY,
Stone and Webster Engineering Corp., Boston, MA. Environmental Engineering Div.
E. J. Horst.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 297-310, 6 fig, 3 tab, 18 ref.

Descriptors: *Environmental effects, *Powerplants, Populations, Model studies, Fish, Mortality, Life history studies.

This paper investigates the effect of life history on the population growth rate when additional mortality occurs in early life. Fish population dynamics are modeled using the Leslie model to assess impact by eigenvalue analysis and by simulation. With the use of eigenvalue analysis, growth rate, age distribution, and population stability are investigated. Four fish populations are modeled at equilibrium with a stable age distribution. The effect of power plant mortality is modeled as a reduced survivorship in the first year of life. In order, from most to least, affected of the fish populations studied were silverside, menhaden, winter flounder, and cunner. These results are generally consistent with the life history theory of r- and k-selection. It was concluded that in the selection of a species for assessment, consideration should be given to susceptibility and sensitivity of the species to perturbation. (See also W78-05251) (Chilton-ORNL)
W78-05266

SENSITIVITY ANALYSIS APPLIED TO A MATRIX MODEL OF THE HUDSON RIVER STRIPED BASS POPULATION,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
S. B. Saila, and E. Lorda.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 311-332, 5 tab, 18 ref.

Descriptors: *Environmental effects, *Powerplants, Model studies, Population, Mortality, Striped bass, *Hudson River, Growth stages, Leslie matrix model, Sensitivity analysis.

The Leslie matrix model was used to examine the dynamics of the Hudson River striped bass population. The results of the simulations suggested that the dominant latent root of the population matrix is relatively insensitive to increased mortality in age class 0; the derived population parameters and measures of perturbation (consisting of the mean reproductive value, the stable population unit, the stable growth rate, the perturbation index, and the relative adult popula-

tion size after a finite period) are more descriptive of population effects resulting from perturbations than is the dominant latent root. If only one of the five life stages in age class 0 is subjected to increased mortality, the population can tolerate losses up to 20% before being reduced to 50% of its initial size in 20 years but if each of the stages in age class 0 is subjected to increased mortality, the % loss/life stage must be less than 5% to not have the size of the adult population reduced by 50% in 20 years. Any reduction in fishing mortality in one or several of the age classes 3 to 20 will permit a higher tolerance for additional mortality in the y-o-y life stages. (See also W78-05251) (Chilton-ORNL)
W78-05267

COMPARISON OF SIMULATION MODELS USED IN ASSESSING THE EFFECTS OF POWER-PLANT-INDUCED MORTALITY ON FISH POPULATIONS,
Washington Univ., Seattle. Center for Quantitative Science.
G. Swartzman, R. Deiso, and C. Cowan.
CONF-770501. In: Proceedings of the Conference on Assessing the Effects of Power-Plant-Induced Mortality on Fish Populations held in Gatlinburg, Tennessee, May 3-6, 1977. p 333-361, 3 fig, 4 tab, 31 ref.

Descriptors: *Environmental effects, *Powerplants, *Model studies, Fish populations, Mortality, Striped bass.

Eight models for assessing powerplant impacts on fish populations are compared. The focus of the comparison between models is on locating differences between models which result in different values of PR, long-term fishery yield, or first-year adult population size. In the striped bass life cycle models, major differences in predictions of yield and population reduction result from using density-dependent vs density-independent fishing mortality and from using different values for the probability of natural survival of fish in age classes 1-3. Entrainment factors, total egg production, equilibrium population size, and survival probabilities were major differences in parameter values for the life cycle models. (See also W78-05251) (Chilton-ORNL)
W78-05268

STUDY OF THE ECOLOGY OF IRON BACTERIA OF FRESH WATER RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow, Inst. Mikrobiologii.
G. A. Dubinina.
Izv Akad Nauk SSSR Ser Biol 4, p 575-592, 1976.

Descriptors: Bacteria, Ecology, *Iron bacteria, Lakes, Morphology, Reservoirs, Swamps, Water pollution effects, Distribution, Path of pollutants.

Data bearing on the distribution of the iron bacteria species in various types of lakes and swamps of the humid zone are presented. The influence of the concentration of Fe, Mn, O2; the presence of humic substances; and temperature influence the number of iron bacteria and their vertical distribution in the lakes. The morphological and cytological peculiarities of the separate representatives, important from the ecological point of view, are described.--Copyright 1977, Biological Abstracts, Inc.
W78-05269

MERCURY CONTAMINATION: A HUMAN TRAGEDY,
Michigan State Univ., East Lansing. Dept. of American Thought and Language.
P. A. D'Itri, and F. M. D'Itri.
Environmental Management, Vol 2, No 1, p 3-16, January 1978. 4 fig, 54 ref.

Descriptors: *Mercury, *Toxins, *Poisons, *Fungicides, *Chemical industry, Water pollution, Fishing, Fishkill, Aquatic environment, Grains, Wheat, Barley, Industrial wastes, Waste water disposal, Waste water(Pollution).

The impact of mercury contamination of fish and grain seeds on humans, the environment, and economies was documented. The first historical instance of large scale mercury poisoning occurred in Japan three years after the Shin Nihon Chisso Co began discharging wastes into Minamata Bay. Residents of Minamata Bay who ate fish conaining up to 50 ppm of mercury developed constricted vision, mental imbalance, numbness in the extremities, decreased muscle coordination, and loss of speech, hearing, and taste as a result of methylmercury poisoning. Children born to victims of the poisoning were often deformed and mentally retarded; residual poisonings were still occurring after 1960, eight years after the initial discovery of methylmercury poisoning. Seed grain treated with alkylmercury fungicides was found to be the source of alkylmercury poisoning of animals birds, and farmers in Sweden during the 1960's. An alkylmercury poisoning epidemic occurred in Iraq in 1971-1972 when nearly 100,000 metric tons of alkylmercury-treated wheat and barley were shipped to that country. The grain, labelled as poisonous, was used by rural inhabitants to make flour, and later contaminated meat supplies and fish. Isolated cases of mercury poisoning in the United States have been attributed to contaminated grain-fed livestock and contaminated swordfish. Indian guides in Ontario, Canada, developed mercury poisoning after eating fish which contained up to 7 ppm of mercury as a result of the discharge of mercury bearing waste into lakes by a chemical company. Monetary compensation and assistance to victims, especially in Canada and Japan, have been considerable. (Lisk-FIRL)
W78-05278

CORRELATION COEFFICIENTS IN CHARACTERISTICS OF BACTERIOPLANKTON AND EVALUATION OF THEIR IMPORTANCE IN MODELING, (IN RUSSIAN),
Irkutskii Gosudarstvennyi Univ. (USSR). Scientific Research Inst. of Biology.
O. M. Kozhova, and L. M. Mamontova.
Gidrobiol zh 12(5), p 63-66, 1976.

Descriptors: *Bacterioplankton, *Heterotrophs, *Mathematical models, Seasonal, *Correlation analysis, Ecosystems, Model studies.

The dependence of the general population of bacteria and heterotrophs on a series of biotic and abiotic factors were studied by means of a paired correlation and a large diversity of relationships between these indices was established. Levels and coefficient values of the correlation were ambiguous and changed according to season, year and horizon. The test confirmed the necessity of statistical development of material for determination of reliable relationships between components of the ecosystem imperative for establishment of mathematical models.--Copyright 1977, Biological Absracts, Inc.
W78-05285

MICROBIAL AEROSALS FROM FOOD-PROCESSING WASTE SPRAY FIELDS,
Army Dugway Proving Ground, UT.
For primary bibliographic entry see Field 5E.
W78-05290

QUALITATIVE AND QUANTITATIVE DETERMINATION CHLORINATED ORGANIC COMPOUNDS IN WASTE WATERS FROM BLEACHING WORKS BY GAS CHROMATOGRAPHY AND MASS SPECTROSCOPY (QUALITATIVE AND QUANTITATIVE BESTIMMUNG VON CHLORIERTEN ORGANISCHEN VERBINDUND IN BLEICHEREIABWAESSERM MITTELS GASCHROMATOGRAPHIE UND MASSENSPEKTROSKOPIE),
Swedish Forest Products Research Lab., Stockholm.
For primary bibliographic entry see Field 5A.
W78-05320

LONG TERM PEACE RIVER CHARACTERISTICS AS A MEASURE OF A PHOSPHATE SLIME SPILL IMPACT,
University of South Florida, Tampa. Dept. of Chemistry.
D. F. Martin, and Y. S. Kim.
Water Research, Vol. 11, No. 11, p 963-970, 1977. 2 fig, 3 tab, 30 ref.

Descriptors: *Phosphates, *Molybdenum, *Iron, *Humic acids, *Mine wastes, Florida, Red tide, Phosphorous, Carbon, Fishkill, On-site data collections, Sampling, Industrial wastes, Rivers.

Water samples collected from the Peace River in Florida following a 1971 phosphate slime spill were compared with 174 samples in an evaluation of the long-range pollution effects and possible correlations with red tide blooms. Water samples taken at four monitoring stations were analyzed for dissolved organic carbon, chelated iron, molybdenum, phosphorus, and humic and tannic acids. Constituent fluxes for each station and correlation coefficients of the tested parameters were calculated; percent deviations were established. The results indicated that iron or molybdenum sources changed considerably after the phosphate slime spill, but returned to normal by 1974. The correlation coefficient between iron and phosphate concentration was positive in 1972. In 1974, negative correlation coefficients were observed. The phosphate spill was found responsible for the death of 90% of the fish population in the polluted areas, with population recovery requiring 15-24 months. Iron and molybdenum concentrations were thought to have an indirect effect on the growth of red tidal blooms in the receiving bay waters. (Lisk-FIRL)
W78-05328

TREATMENT OF WASTE WATER FOR EUTROPHICATION CONTROL (SANGYO HAISUI NO FUEIYOKASEIBUN NO SHORI NI KANSURU KENKYU),
Fermentation Research Inst., Tokyo (Japan) Div. of Microbe Engineering.
For primary bibliographic entry see Field 5D.
W78-05342

WORKSHOP PROCEEDINGS: RESEARCH NEEDS RELATED TO ACID MINE WATER.
West Virginia Univ., Morgantown. Water Research Inst.
For primary bibliographic entry see Field 5G.
W78-05345

TOXICITY OF BLUE-GREEN ALGAE, CAUSATIVE AGENTS OF 'WATER BLOOM', (IN RUSSIAN),
Akademiya Nauk URSR, Kiev Inst. Hidrobiologii.
L. A. Sirenko, Yu. A. Kirpenko, L. F. Lukina, O. V. Kovalenko, and L. M. Zimovets.
Gidrobiol Zh 12(4), p 22-28, 1976.

Descriptors: *Cyanophyta, *Eutrophication, *Decomposing organic matter, Algae, Daphnia-magna, *Microcystis-aeruginosa, Mineralization, *Toxicity, Water pollution effects, Sampling, Biomass, Rodents.

The maximal toxicity of blue-green algae, agents of water blooms, is found at the mixed algological composition of biomass samples, the viable colonies of Microcystis aeruginosa being prevalent. At the initial stages of decomposition, toxicity may

increase due to the other products of organic matter decomposition. Deep mineralization of the latter lowers the biological activity of the toxic compounds with respect to water fleas (Daphnia magna) and albino rats.--Copyright 1977 Biological Abstracts, Inc.
W78-05347

PESTICIDES IN IOWA SURFACE WATERS: SUMMARY OF A WORKSHOP HELD MARCH 1977.
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 5B.
W78-05349

BIOGEOCHEMISTRY OF DEEP LAKES IN THE CENTRAL ALASKAN RANGE,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 5A.
W78-05358

PROSPECTS OF STUDYING EUTROPHICATION IN BODIES OF WATER OF RECREATION COMPLEXES, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. Geografii.
I.. L. Rossolimo.
Gidrobiol Zh 12(4), p 5-10, 1976.

Descriptors: *Eutrophication, *Recreation, Water pollution effects, *Waste loading.

Changes in the regime of recreational water bodies according to the relation of water body loading by eutrophic substances and recreation loading (the number of guests, time of their stay at the water body, etc.) are studied. The effect of anthropogenic action in different water bodies is determined by both the value of loads and significant trophic and morphological indexes of the water body: littorals within the recreation zone, and the whole water body.--Copyright 1977 Biological Abstracts, Inc.
W78-05457

THE ACCUMULATION OF CHLORINATED CONSTITUENTS FROM PRE-BLEACHING EFFLUENTS IN A FOOD CHAIN IN WATER,
Pulp and Paper Research Inst., Helsinki (Finland).
O. Seppovaara, and T. Hattula.
Paperi ja Puu, Vol. 59, No. 8, p 489-494, August, 1977. 5 fig, 12 ref, 1 tab.

Descriptors: *Bleaching wastes, *Food chains, *Water pollution effects, Wastes, Industrial wastes, Pulp wastes, Pulp and paper industry, Effluents, Bacteria, Mollusks, Fish, Pine trees, Microorganisms, Water pollution, Mixing, Waste dilution, Water pollution sources, Daphnia, Aquatic life, Chlorine radioisotopes, Chlorine, Kraft pulp, Kraft mills, Planorbarius, Guppies, Lebister reticulatus, Chlorine compounds.

The accumulation of Cl(36)-labeled chlorinated constituents from prebleaching of pine sulfate pulp in a food chain comprising bacteria, water fleas (Daphnia pulex), molluscs (Planorbarius), and guppies (Lebister reticulatus) was investigated in test aquaria. The strong sublethal concentrations used were 2% for chlorination-stage and 6% for alkaline-extraction stage effluents. The synergistic effect of all chlorinated compounds was slight. Accumulation factors in the steady state in chlorination-stage tests were about 10 for the fish flesh and molluscs and 20 for the liver. In the extraction-stage tests the corresponding values were about 9 and 14, respectively. Mixing with total mill effluent and dilution in the recipient water should also greatly reduce accumulation. The organisms almost completely eliminated the accumulated substances in 10 days. (Brown-IPC)
W78-05459

CHEMICAL IDENTIFICATION OF CONSTITUENTS IN A TOXIC HARDBOARD PLANT EFFLUENT.
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5A.
W78-05464

ENVIRONMENTAL (IMPACT) ASSESSMENT: DONOHUE-ST. FELICIEN (KRAFT MILL) PROJECT,
Beak Consultants Ltd., Mississauga (Ontario).
W. Eedy, and K. Schiefer.
In: Canadian Pulp and Paper Association, Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), p 51-57. 5 fig, 4 ref.

Descriptors: *Pulp wastes, *Water pollution effects, *Simulation analysis, Wastes, Industrial wastes, Water pollution sources, Pulp and paper industry, Effluents, Foreign countries, Canada, Aquatic environment, Atlantic salmon, Aquatic animals, Fish, Salmon, Invertebrates, Water quality, Toxicity, Environmental effects, Feasibility studies, *Kraft mills, Ashuapmouchouan River(Canada).

The aquatic studies are emphasized in this review of an environmental impact assessment prepared for the proposed Donohue-St. Felicien bleached kraft mill in Quebec. The studies conclude that no adverse impacts from the mill will be incurred by the local aquatic environment. The flows and assimilative capacity of the Ashuapmouchouan River are adequate to prevent significant deterioration of water quality outside the mixing zone. The simulated effluent is not toxic to landlocked Atlantic salmon or locally important invertebrate species. Effluent concentrations even during periods of the lowest recorded flows from the mill site area should not deter migrating salmon. (Swichtenberg-IPC)
W78-05467

IMPACT OF NON-SETTLEABLE SUSPENDED SOLIDS ON RECEIVING WATERS,
B. C. Research Ltd., Vancouver.
E. G. H. Lee, J. C. Mueller, and C. C. Walden.
In: Canadian Pulp and Paper Association, Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), p 105-110. 3 fig, 11 ref, 6 tab.

Descriptors: *Pulp wastes, *Suspended solids, *Water pollution effects, Wastes, Industrial wastes, Water pollution sources, Turbidity, Photosynthesis, Nutrients, Algae, Nitrogen, Phosphorus, Microorganisms, Aquatic life, Pulp and paper industry, Effluents, Fertilization, Water pollution, Pollutants.

Bleached kraft mill effluents (BKME) contain 5-21 lb/air-dry ton nonsettleable suspended solids and contribute up to 2 mg/liter suspended solids to receiving waters (assuming a minimal dilution of 1/40). Turbidity is increased slightly by nonsettleable solids. Light absorbance data suggest that 1-2 mg/liter nonsettleable solids reduces the depth of the eutrophic zone but does not reduce overall photosynthetic activity due to the scattering of incident light (as contrasted with absorption) by nonsettleable solids. Nonsettleable solids from raw and limed clarified BKME are low in nutrients and have minimal fertilization effects on algal production whereas nonsettleable solids from biotreated BKME are rich in N and P and stimulate algal growth. Inhibitive effects of nonsettleable solids on algal productivity have not been observed. (Swichtenberg-IPC)
W78-05471

STEAM STRIPPING OF CONDENSATES FOR REMOVAL OF ODOR, FIVE-DAY BOD, TOXICITY AND FISH TAINTING PROPENSITIES,
B. C. Research Ltd., Vancouver.
For primary bibliographic entry see Field 5D.
W78-05473

EFFECTS OF SULFITE WASTE LIQUOR COLOR ON ALGAL GROWTH,
Lakehead Univ., Thunder Bay (Ontario).
R. G. Rosehart, and H. Muzik.
In: Canadian Pulp and Paper Association, Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), 16 p. 4 fig, 3 ref, 1 tab.

Descriptors: *Sulfite liquors, *Water pollution effects, *Algae, *Color, Pulp wastes, Wastes, Industrial wastes, Water pollution sources, Aquatic life, Microorganisms, Chlorella, Aquatic algae, Pulp and paper industry, Effluents.

After an incubation period of 8 days, spent sulfite liquor (containing 300 APHA color standard units) at depths of 2, 3, and 5 cm in plexiglass cells fitted over a water bath containing the cell culture flasks reduced the growth of Chlorella vulgaris by 25, 27, and 35%, respectively. The effects of color were more harmful than toxicity for the conditions studied. (Swichtenberg-IPC)
W78-05474

DYNAMICS OF MANGANESE, CADMIUM AND LEAD IN EXPERIMENTAL POWER PLANT PONDS,
Bradley Univ., Peoria, IL. Dept. of Chemistry; and Bradley Univ., Peoria, IL. Dept. of Biology.
For primary bibliographic entry see Field 5A.
W78-05480

SANITARY BACTERIOLOGICAL AND VIROLOGICAL CONTROL OF WATER BODIES, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
For primary bibliographic entry see Field 5B.
W78-05504

PHYTOPLANKTON IN A TEMPERATE-ZONE SALT MARSH: NET PRODUCTION AND EXCHANGES WITH COASTAL WATERS,
State Univ. of New York at Stony Brook. Dept. of Ecology and Evolution.
R. A. Moll.
Marine Biology, Vol 42, p 109-118, 1977. 7 fig, 4 tab, 27 ref.

Descriptors: *Salt marshes, *Primary productivity, *Phytoplankton, *Carbon cycle, Wetlands, Marshes, Tidal marshes, Coastal marshes, Aquatic microorganisms, Cycling nutrients, Photosynthesis, Plankton, Nutrients, Sea water, New York, Light penetration, Light intensity, Shallow water, *Flax Pone, Long Island(NY), Extinction coefficients, Coastal waters.

Phytoplankton production and associated variables were measured in Flax Pond, a 52 ha salt marsh, to determine mean annual net primary production. Productivity on a mg carbon/cu m/hour basis was quite high due to the high levels of nutrients in the salt marsh. However, when the productivity values were reduced by the combined effect of high extinction coefficients and the shallow basin of water water available for photosynthesis, the net production by phytoplankton was small. Dividing the net production estimates by the number of square meters in the entire salt marsh resulted only in 11.7 g carbon/sq m/year fixed by phytoplankton, a small fraction of normal nearshore production. There was a net flux of phytoplankton from the coastal waters into the marsh; during the summer up to 0.2 g

chlorophyll/sq m of phytoplankton was carried in with the tides daily and remained in the marsh. Analysis of the productivity data, as well as variables associated with productivity (pH, standing crop, nutrients, extinction coefficient), indicated that the aquatic portion of the marsh behaved more as a net consumer rather than a net producer of phytoplankton. (Steiner-Mass)
W78-05511

FLAX POND ECOSYSTEM STUDY: EXCHANGES OF PHOSPHORUS BETWEEN A SALT MARSH AND THE COASTAL WATERS OF LONG ISLAND SOUND,
Marine Biological Lab., Woods Hole, MA.
G. M. Woodwell, and D. E. Whitney.
Marine Biology, Vol. 41, p 1-6, 1977. 3 fig, 1 tab, 19 ref.

Descriptors: *Coastal marshes, *Phosphorus, *Seasonal, *Cycling nutrients, Wetlands, Tidal marshes, Salt marshes, Grasses, Organophosphorus compounds, Phosphates, Coasts, Sea water, *New York, Nutrients, Phytoplankton, Marsh plants, *Flax pond, *Long Island Sound(NY), Coastal waters, Spartina alterniflors.

A study of a tidal Spartina alterniflora marsh shows that net exchanges of phosphate, organic phosphorus, and total phosphorus occur at various times throughout the year, but that there is no net gain or loss from the marsh over a yearly period. Both forms of phosphorus followed seasonal patterns of concentration. Phosphate concentrations declined rapidly starting in February, from winter highs of 75-100 micrograms/liter to a minimum of about 20 in April. The decline corresponded to the spring phytoplankton bloom in Long Island Sound. Phosphate increased slowly during the summer and rapidly in August to peak in September, when a second, smaller decline occurred in October at the time of the full phytoplankton bloom. The annual organic phosphorus pattern was basically the inverse of the phosphate: winter concentrations tended to be low, summer levels were high, and there were pronounced peaks at the times of spring and fall plankton blooms. The year-to-year variation in organic phosphorus was greater than that for phosphate. The marsh accumulates phosphorus in organic and inorganic forms when abundant and releases it in the most usable form (PO4) during the summer at the times of greatest biotic activity. (Steiner-Mass)
W78-05514

HETEROTROPHIC ACTIVITY ASSOCIATED WITH PARTICULATE SIZE FRACTIONS IN A SPARTINA ALTERNIFLORA SALT-MARSH ESTUARY, SAPELO ISLAND, GEORGIA, USA, AND THE CONTINENTAL SHELF WATERS,
Georgia Univ., Sapelo Island. Marine Inst.
R. B. Hanson, and W. J. Wiebe.
Marine Biology, Vol. 42, p 321-330, 1977. 6 fig, 2 tab, 37 ref.

Descriptors: *Salt marshes, *Detritus, *Particle size, *Degradation(Decomposition), *Estuaries, Wetlands, Marshes, Tidal marshes, Coastal marshes, Plankton, Deterioration, Decomposing organic matter, Tides, Carbon radioisotopes, Bacteria, *Georgia, Tidal waters, Continental shelf, *Heterotrophic activity, *Sapelo Island(Geo).

An investigation was undertaken to determine the distribution and activity of the heterotrophic microplankton associated with particles from a salt marsh-estuarine ecosystem to the western edge of the Sargasso Sea. Heterotrophic activity was determined by the uptake of C14-glucose. More than 80% of the activity was associated with detritus greater than 3 micrometers in creek, river, and coastal (within 4 km of shore) waters. In the Gulf Stream, approximately 80% of the heterotrophic activity was in the fraction les than 3 micrometers. In the estuary, total heterotrophic activity fluctuated with the tides: the greatest activity occurred near low ebb tide at all locations. The lowest activity was measured at slack low and high tides. In creek water most of the heterotrophic activity was associated with particles between 14 and 180 micrometers, whereas in coastal waters most of the activity was in the fraction greater than 180 micrometers. (Steiner-Mass)
W78-05515

PESTICIDE MODES OF ENTRANCE AND CONTENT IN WATER SUPPLIES, (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W78-05516

A MULTIVARIATE ANALYSIS OF THE NICHES OF PLANT POPULATIONS IN RAISED BOGS. I. NICHE DIMENSIONS,
New Hampshire Univ., Durham. Dept. of Botany.
For primary bibliographic entry see Field 2H.
W78-05517

EFFECTS OF SALINITY AND INUNDATION ON THE GROWTH OF AGROSTIS STOLONIFERA AND JUNCUS GERARDII,
Vrije Univ., Amsterdam (Netherlands). Biological Lab.
J. Rozema, and B. Blom.
Journal of Ecology, Vol 65, p 213-222, 1977. 1 fig, 4 tab, 31 ref.

Descriptors: *Salt marshes, *Halophytes, *Salt tolerance, *Biomass, *Productivity, Wetlands, Tidal marshes, Aquatic plants, Grasses, Resistance, Salts, Tides, Tidal waters, Sea water, *Salinity, Sodium chloride, Sodium, Potassium, Calcium, Phosphorus, Root development, Flooding, *Agrostic stolonifera, *Juncus gerardii, *Netherlands.

Maritime populations of agrostic stolonifera L. and Juncus gerardii Lois--characteristic plant species of sandy and muddy salt marshes--were grown from seed in sand culture at three levels of inundation and two concentrations of sodium chloride. Biomass production, stolon length and internode length were stimulated in A. stolonifera by flooding, wheras biomass, shoot height and rhizome length were depressed in J. gerardii. Addition of seawater markedly depressed the growth of A. stolonifera, whereas that of J. gerardii was not significantly affected. Absence of significant differences in degree of succulence as a result of salinity indicates an unimportant role of succulence as a salt regulation mechanism in both species. Increasing uptake of sodium did not seem to reduce the potassium content, whilst neither inundation nor salinity had a significant effect upon the calcium or magnesium content of the root material, but phosphorus deficiency in shoots did not occur. The metabolic adaptations to waterlogging of these two flooding-tolerant species did not seem to include malate accumulation or stimulation of nitrate reductase activity. (Steiner-Mass)
W78-05519

RESPONSE OF WEST COAST BEACH TAXA TO SALT SPRAY, SEAWATER INUNDATION, AND SOIL SALINITY,
California Univ., Davis. Dept. of Botany.
M. G. Barbour, and T. M. DeJong.
Bulletin of the Torrey Botanical Club, Vol 104, No 1, p 29-34, January-March, 1977. 3 fig, 2 tab, 12 ref.

Descriptors: *Pacific Coast region, *Halophytes, *Beaches, *Ecological distribution, Mortality, Plant morphology, Aquatic plants, Biomass, Wetlands, *Salt spray, *Saline water inundation, *Soil salinity, Tolerance index.

Twelve taxa, characteristic of beach vegetation along the Pacific Coast of the United States, were grown from seed and subjected to realistic levels of salt spray (50 mg/sq dm/day) and seawater inundation (residual soil salinity of 3,328 ppm). Mortality, morphology, and biomass were measured and combined in a tolerance index. For most taxa, this tolerance index correlated well with zonation position in the field (average plant position from tide line inland to foredune; $r > 0.85$). Three or four taxa behaved anomalously, exhibiting either much more or much less tolerance than expected from their zonation position, and we conclude that a single-factor approach is too naive to account for the distribution of all beach taxa. (Stihler-Mass)
W78-05520

AQUATIC METABOLISM OF THE COMMUNITIES ASSOCIATED WITH ATTACHED DEAD SHOOTS OF SALT MARSH PLANTS,
Georgia Univ., Sapelo Island. Marine Inst.
J. L. Gallagher, and W. J. Pfeiffer.
Limnology and Oceanography, Vol. 22, No. 3, p 562-565, 1977. 2 fig, 9 ref.

Descriptors: *Coastal marshes, *Marsh plants, *Carbon cycle, *Detritus, Wetlands, Marshes, *Salt marshes, Tidal marshes, Respiration, Carbon, Degradation(Decomposition), Decomposing organic matter, *Metabolism, Dissolved organic carbon, Atlantic coastal marshes.

The annual aquatic respiration and dissolved organic carbon cycles of the attached dead plant community were examined in two stands of Spartina alterniflora and one of Juncus roemerianus. The two S. alterniflora communities had comparable respiration rates while the J. roemerianus was only half as rapid; the annual patterns in all three stands were similar. Respiration rates were low in winter, increased in later spring and early summer, and dropped sharply in midsummer. Another peak was reached in early fall, after which the rate dropped to the winter low. The dissolved organic carbon pattern was the inverse of the annual temperature cycle except for a high value in July. Without the July value, the correlation coefficient between dissolved organic carbon and incubation temperatures was -0.74. (Steiner-Mass)
W78-05524

LIMITATIONS ON MACROPHYTES IN A EUTROPHIC LAKE, LOCH LEVEN. II. WAVE ACTION, SEDIMENTS AND WATERFOWL GRAZING,
Saint Andrews Univ. (Scotland). Dept. of Botany.
B. P. Jupp, and D. H. N. Spence.
Journal of Ecology, Vol. 65, p 431-446, 1977. 3 fig, 6 tab, 45 ref.

Descriptors: *Pondweeds, *Plant growth, *Waves(Water), *Waterfowl, *Lakes, Rooted aquatic plants, Aquatic plants, Wetlands, Freshwater plants, Submerged plants, Environmental effects, Biomass, Shore protection, Grazing, Sediments, Nutrients, Phytoplankton, Shores, Eutrophication, Water pollution effects, *Loch Leven(Scotland).

Limitations of the two most important submerged macrophytes, Potamogeton filiformis and P. pectinatus, were shown to result from wave action and from grazing by waterfowl. Wave action operated directly, by producing coarser, more nutrient-poor sediments in exposed situations. Protection from wave action and from waterfowl grazing by 'Perspex' tubes and by wire enclosures led to increased biomass levels. These findings were corroborated by transplant experiments between a sheltered and an exposed site. Up to 80% of the end-of-season biomass differences could be attributed to the effects of wave action, the remainder to waterfowl grazing. Shoot lengths of completely protected plants of P. filiformis at the exposed site were only half those of plants growing at the sheltered site, and this difference was correlated with differing phosphorus levels in the sediments. Maximum biomass levels, however, were still low compared with published data for other eutrophic lakes, and this reduction was

attributed to the combined effects of phytoplankton competition, wave action, and grazing. (See also W78-01942) (Steiner-Mass)
W78-05527

ECOSYSTEM IMPACTS OF URBANIZATION ASSESSMENT METHODOLOGY.
Corvallis Environmental Research Lab., OH.
For primary bibliographic entry see Field 6G.
W78-05533

TRITIUM RETENTION BY COWS AND STEERS AND TRANSFER TO MILK,
Environmental Monitoring and Support Lab., Las Vegas, NV.
A. L. Mullen, A. A. Moghissi, J. C. Wawerna, B. A. Mitchell, and E. W. Bretthauer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 975, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-600/3-77-076, June 1977. 17 p, 4 fig, 5 tab, 18 ref.

Descriptors: *Cattle, *Dairy industry, Bioassay, Biochemistry, Radioisotopes, *Tritium, Isotope studies, Radiation, Radioecology, Nevada, Milk, Foods, *Tritiated water, Beef, Radiobiology, Nevada Test Site, Exposure, Half-life.

A study was undertaken in dairy cows and beef animals to evaluate both the short-term and long-term behavior of tritium in a significant source of exposure. Eight lactating dairy cows and three steers received a single oral administration of tritiated water. Milk and blood from the lactating cows and blood from the steers were periodically collected and analyzed for tritium content. The tritium content of whole milk decreased with time, giving a curve expressed as a three component exponential which yielded half-times of 3.04 plus or minus 0.09, 11.1 plus or minuw 2.58, and more than 120 days. Tritium in the blood serum of steers decreased with half-lives of 4.05 plus or minus 0.21 and 40.4 plus or minus 9.82 days. Additional study of the milk to assess tirtium incorporation in the various fractions showed half-times of 2.93 plus or minus 0.14 and 43.7 plus or minus 4.28 days for milk serum; 2.08 plus or minus 0.56 and more than 50 days for milk protein; and 3.28 plus or minus 0.35 and 60.7 plus or minus 43 days for butterfat. There was little significant difference in the rate of tritium in body water turnover in lactating dairy cows vs steers. Although whole milk is the major route of exposure of humans consuming tritiated dairy products, additional information on the turnover rate of tritium in milk solids is necessary before an accurate determination of radiation dose can be made. Further studies with a biological receptor are recommended to estimate accurately the exposure/dose resulting from tritium consumption. (Wares-IPA)
W78-05537

129I IN ANIMAL THYROIDS FROM NEVADA AND OTHER WESTERN STATES,
Environmental Monitoring and Support Lab., Las Vegas, NV. Monitoring System Research and Development Div.
For primary bibliographic entry see Field 5A.
W78-05541

HEALTH EFFECTS OF NITRATES IN WATER,
Hebrew Univ., Jerusalem (Israel). Environmental Health Lab.
H. I. Shuval, and N. Gruener.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 479, Price codes: A08 in paper copy, A01 in microfiche. Report No EPA-600/1-77-030, June, 1977. 149 p, 31 fig, 52 tab, 153 ref, 2 append. IBA614. 06-012-3.

Descriptors: *Nitrates, *Nitrites, *Potable water, *Public health, Epidemiology, Toxicity, Pollutants, Water pollution effects, *Hemoglobins, Infants, Rats, Israel.

The results of a series of field and laboratory studies designed to evaluate the health effects of nitrates in drinking water are presented. Epidemiological studies indicated that infants consuming appreciable amounts of water high in nitrates in the form of powdered milk formula show raised methemoglobin levels. This is also true for infants consuming tap water with a nitrate concentration ranging from 45 to 55 ppm and provides direct epidemiological evidence in support of the current nitrate standard in drinking water of 45 ppm. Laboratory studies of the acute and chronic toxic effects of nitrites indicate that: (1) nitrites can pass the placenta of the rat, causing raised methemoglobin levels in the fetus; (2) pregnant rats are particularly sensitive to exposure to nitrites; (3) pups born to dams exposed to nitrites during gestation show poor growth and development; (4) rats exposed to sodium nitrite in drinking water for 18 months show distinct deviations in heart blood vessels. Exposure of mice to nitrites in drinking water causes behavioral effects such as lowered motor activity and increased isolation-induced aggression. Epidemiological and toxicological study results provide little basis for a liberalization of the current drinking water standard for nitrates (45 ppm), and some evidence is presented which questions whether the current standard provides a sufficient margin of safety below the detectable effect level. It is suggested that nitrates and nitrites may be more toxic than previously considered. (Wares-IPA)
W78-05543

ECOLOGICAL AND AESTHETIC IMPLICATIONS FOR THE MERRIMACK ESTUARY OF THE MERRIMACK BASIN WASTEWATER MANAGEMENT ALTERNATIVES,
Massachusetts Univ., Gloucester, Marine Station.
P. F. Smith, and E. Gilfillan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 141, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, April, 1975. 35 p, 1 fig, 4 tab, 12 ref. OWRT A-058-MASS(1).

Descriptors: *Estuaries, *Fish establishment, *Fish ladders, *Water pollution effects, *Water pollution control, *Sewage effluents, Waste water treatment, Shellfish, Clams, *Fish populations, Massachusetts, Ecology, Aesthetics, *Merrimack River estuary(Mass), *Merrimack River(Mass).

Physical and biological conditions of the Merrimack estuary and pollution abatement plan consequences are assessed. History and present status of the indigenous fish and shellfish populations are reported. Dams and upstream pollution have eliminated entire populations of migratory fish; sewage contamination of softshell clambeds has virtually destroyed a once-lucrative commerical fishery industry. High river pollution levels resulted from industrialization and population of river basin communities. Temperature, salinity, fecal coliform counts, pesticide residues, detergent content, nutrient and bacterial levels, dissolved oxygen flushing rate, and productivity are reported. Since the closing of many industrial mills, the estuary is at its best in 100 years; all present pollution results from upstream sewage effluence. Waterflow populations and habitats are described; indirect pollutant effect on birds results only from prey contamination. Construction of fish ladders around the existing Merrimack river dams is recommended to effectively reestablish sport and commerical fishery industries. Pollution abatement would significantly enhance esthetic and recreational values. Impact assessments are made of wastewater management schemes for (1) removing all pollutants from the river without diverting any river water; (2) diverting about 500 million gallons of water/day and removing all pollutants; (3) diverting 250-500 million gallons/day at all times and removing pollutants. Water nutrients levels and indigenous estuary flora and fauna are listed. (Seip-IPA)
W78-05554

ANILINES: SELECTIVE TOXICITY TO BLUE-GREEN ALGAE,
Texas Univ. at Austin, Port Aransas. Marine Science Inst.
J. Batterton, K. Winters, and C. Van Baalen.
Science, Vol 199, No 4333, March 1978, p 1068-1070, 1 fig, 2 tab, 16 ref.

Descriptors: *Cyanophyta, *Environmental effects, *Water pollution effects, *Toxicity, Pollutant identification, Algae, Bioassay, Water pollution effects, *Anilines.

Agmenellum quadruplicatum (strain PR6) was found to be sensitive to aniline and p-toluidine. Lawn assays showed growth inhibition of the algae by p-toluidine and aniline at 1 microg per disk and 50 ppb in liquid culture. Seven other species of blue-green algae indicated varying sensitivities ranging from 1 to 100 micrograms of p-toluidine. Experiments in which rates of photosynthesis and respiration of strain PR6 were monitored revealed only a gradual decline of these processes over the time period coinciding with the loss of viability. (Chilton-ORNL)
W78-05556

BLUE-GREEN ALGAL INHIBITION OF DIATOM GROWTH: TRANSITION FROM MESOTROPHIC TO EUTROPHIC COMMUNITY STRUCTURE,
Rutgers - The State Univ., New Brunswick, NJ. Dept. of Environmental Science.
K. I. Keating.
Science, Vol 199, No 4332, March 1978, p 971-973, 1 fig, 1 tab, 18 ref.

Descriptors: *Cyanophyta, Environmental effects, Biological communities, Populations, Algae, *Diatoms, *Eutrophication, *Algal toxins, *Inhibition, Inhibitors, *Mesotrophy, Trophic levels, Water pollution effects, Allelopathy.

An inverse correlation between winter populations of blue-green algae and the levels of spring diatom bloom indicate that under apparently favorable conditions the ability of an endogenous diatom species to develop bloom is limited by the occurence of a blue-green attributed to a waterborne substance. Detailed study of filtrates of axenic Anabaena holsaticum indicated the presence of a complex of metabolic products which in combination inhibit diatom growth. Blue-green algal dominance of euthrophic lakes is attributed to this allelopathy. It is suggested that dilution is one cause for the limited occurrence of blue-green algal dominance in marine waters. (Chilton-ORNL)
W78-05557

DISTRIBUTION OF OXADIAZON AND PHOSALONE IN AN AQUATIC MODEL ECOSYSTEM,
Agricultural Research Service, Beltsville, MD. Agricultural Environment Quality Inst.
D. Ambrosi, A. R. Isensee, and J. A. Macchia.
Journal of Agricultural and Food Chemistry, Vol 26, No 1, January-February 1978, p 50-53, 2 fig, 2 tab, 7 ref.

Descriptors: Environmental effects, *Water pollution effects, Herbicides, Insecticides, Algae, Snails, Daphnia, Fish, Toxicity, *Path of pollutants, Distribution, *Oxadiazon, *Phosalone.

Four species of aquatic organisms (algae, snails, daphnids, and fish) were exposed to oxadiazon and phosalone in a model ecosystem for 48 and 31 days, respectively. Oxadiazon was introduced to the ecosystem adsorbed to 400 g of soil at the rate of 1 and 10 ppm. Soil treated with 10 ppm phosalone was aged for 84 days before being introduced into the system. Snails were the only organisms unaffected by both oxadiazon and phosalone. Algae growth was severely reduced by oxadiazon but was not affected by phosalone.

Daphnid and fish were unaffected by oxadiazon but both were killed by phosalone. All organisms accumulated oxadiazon and phosalone 30 to 300 times greater than the water content. (Chilton-ORNL)
W78-05558

TRITIUM OXIDE UPTAKE BY ALGAE: AN INDEPENDENT MEASURE OF PHYTOPLANKTON PHOTOSYNTHESIS,
Michigan State Univ., Hickory Corners. W.K. Kellogg Biological Station.
For primary bibliographic entry see Field 5A.
W78-05559

DIVERSITY OF SHALLOW-WATER GASTROPOD COMMUNITIES ON TEMPERATE AND TROPICAL BEACHES,
Woodward-Clyde Consultants, San Francisco, CA.
T. M. Spight.
The American Naturalist, Vol III, No 982, November-December 1977, p 1077-1097, 3 fig, 7 tab, 1 append, 54 ref.

Descriptors: Environmental effects, *Latitudinal studies, *Ecological distribution, Ecotypes, Tropical regions, Temperate, *Gastropods, *Snails, *Distribution patterns, Habitats.

Prosobranch gastropod assemblages on a tropical and a temperate rocky shore were compared to evaluate how composition changes when there is a five-fold difference in regional species list. Tropical beach quadrats contained no more species than did ones from the temperate beach. Locally, diversity varied with habitat structure (shore height and substrate). Structure-diversity relationships were different at the two latitudes. High-shore habitats supported more in the tropical community and low-shore rock habitats were equally diverse at both latitudes. Diversity and density varied more among adjacent habitats on any one beach than among latitudes within a particular habitat type. (Chilton-ORNL)
W78-05560

TEMPERATURE RELATIONS OF AERIAL AND AQUATIC RESPIRATION IN SIX LITTORAL SNAILS IN RELATION TO THEIR VERTICAL ZONATION,
Texas Univ. at Arlington. Dept. of Biology.
R. F. McMahon, and W. D. Russell-Hunter.
The Biological Bulletin, Vol 152, No 2, April 1977, p 182-198, 6 fig, 1 tab, 57 ref. 15-653, NSF BMS-72--2511-A01.

Descriptors: Environmental effects, *Temperature, *Respiration, *Snails, Intertidal areas, Aquatic habitats, Terrestrial habitats, *Littoral, Oxygen requirements, *Vertical zonation, Aerial respiration, Aquatic respiration.

Aerial and aquatic oxygen consumption rates were determined over a range of 5-45C at 5C intervals for six species of marine littoral snails. Three subtidal species (Acmaea testudinalis, Lacuna vincta, and Mitrella lunata) did not show any metabolic adjustment to increasing temperature, with thermal limits reached at 30 to 35C. Aerial respiration in A. testudinalis was similar to aquatic respiration but rates averaged only 36.4% of aquatic rates. Intertidal congeners (Littorina obtusata, L. littorea and L. saxatilis) showed varying degrees of aerial and aquatic metabolic regulation with increasing temperature. L. obtusata showed a respiratory pattern of passive endurance to high temperatures in air and in water. L. littorea remained active when exposed to air and had a zone of metabolic regulation between 20 and 30C. L. saxatilis is exposed to air for 70-95% of the tidal cycle and is characterized by reduced aerial and aquatic respiration rates above 25C. (Chilton-ORNL)
W78-05561

GENETIC ASPECTS OF LARVAL GROWTH UNDER REDUCED SALINITY IN MYTILUS EDULIS,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Biology.
D. J. Innes, and L. E. Haley.
The Biological Bulletin, Vol 153, No 2, October 1977, p 312-321, 3 fig, 2 tab, 30 ref.

Descriptors: Environmental effects, *Salinity, Larvae, *Larval growth stage, *Growth rates, Genetics, *Mollusks.

Adult specimens of Mytilus edulis in spawning conditions were collected from a shallow, enclosed bay which was known to experience fluctuations in salinity. Growth of resulting larvae showed no significant difference in mean length between larvae raised at 30% salinity than those raised at 18% salinity after 18 days growth. Salinities below this significantly decreased growth. Families of larvae of known parentage raised at different salinities indicated substantial genetic variation in larval length measured 16 days after fertilization, as well as significant genetic interaction with salinity. This was interpreted as the presence of genes influencing larval growth which depend on salinity for their expression and may be related to the past selective influence of a fluctuating environment. (Chilton-ORNL)
W78-05562

THE ONTOGENY OF SWIMMING BEHAVIOR IN THE SCYPHOZOAN, AURELIA AURITA. II. THE EFFECTS OF IONS AND DRUGS,
Maryland Univ., College Park. Dept. of Zoology.
W. E. Schwab.
The Biological Bulletin, Vol 152, No 2, April 1977, p 251-262, 3 fig, 4 tab, 25 ref. NSF GB-36437.

Descriptors: *Environmental effects, *Behavior, Ions, Physiological ecology, Sodium Lithium, Potassium, Chlorine, Calcium, Magnesium, Pharmological agents, Swimming behavior, Procaine, Caffeine, Tryptamine, Veratrine, Aurelia aurita.

Responses of Aurelia medusae to pharmacological agents (procaine, caffeine, tryptamine, and veratrine) and ionic variation (sodium, lithium, potasium, chlorine, calcium, and magnesium ions) were classified into four respnse types: no response; inhibition of pacemaker activity; inhibition of both pacemakers and swimming muscles; and increase in pacemaker output. Swimming pacemakers of Aurelia medusae became hyperactive in Mg+2 free solutions. This response appeared to be general in swimming scyphozoa. The response pattern to pharmacologically-active compounds indicated that the coelentrate neuromuscular system is different from those of other phyla. The response spectrum is not consistent within the Cnidaria. Responses of adult medusae to ionic variation showed no consistent pattern within various scyphomedusae. Comparison of responses to test solutions of the medusa, scyphistoma, and strobila showed that the neuromuscular systems are physiologically different. (Chilton-ORNL)
W78-05564

ASPECTS OF THE RELATIONSHIP BETWEEN TEMPERATURE AND AQUATIC CHEMISTRY,
Miami Univ., Coral Gables, FL. Lab. for Water Research.
W. Drost-Hansen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 612, Price codes: A07 in paper copy, A01 in microfiche. Report to Environmental Protection Agency, Washington, D.C. May 1973. 148 p, 28 fig, 66 tab. EPA-68-01-1811.

Descriptors: *Water temperature, Aquatic life, *Physical properties, *Chemical properties, Water properties, Reviews, Density, Thermal expansion, Vapor pressure, Osmosis, Hydrogen ion concentration, Ions, Specific heat, Thermal conductivity, Viscosity, Diffusion, Surface tension, Solubility, *Thermal pollution, Water pollution effects.

The purpose of this review was threefold: first, to examine the effects of temperature on the physical and chemical properties of natural waters (specifically water of interest to the continental United States), second, to discuss some of the influences of the chemical changes-effected by temperature changes-on the suitability of these waters to support life; and third, to delineate some of the effects and the underlying mechanisms of temperature changes on the cell chemistry of the aquatic biota, that is, a thermochemical perspective of the aquatic biology under possible heat stress. (Henley-ISWS)
W78-05588

FEEDING EXPERIMENTS WITH MYTILUS EDULIS L. AT SMALL LABORATORY SCALE. III FEEDING OF WASTE ORGANIC PRODUCTS FROM THE FISH INDUSTRY OF BREMERHAVEN AS A MEANS OF RECYCLING BIODEGRADABLE WASTES,
Institut fuer Merresforschung Bremerhaven (West Germany).
J. Murken.
10th European Symposium on Marine Biology, Ostend, Belgium. Vol. 1, p. 273-284, 1975. 1 fig, 3 tab, 22 ref.

Descriptors: Commercial fishing, *Organic wastes, *Decomposing organic matter, *Animal growth, *Biodegradation, *Mussels, Commercial shellfish, *Shellfish farming, *Mortality, *Recycling, *Pollution abatement, *Silts, *Suspended solids, *Algae, Waste water(Pollution), *Tissue analysis.

At a discontinuous feeding regime 700 mussels were fed with different amounts of pure fish-waste water(fish debris and dissolved organic material) and with several combinations of waste water, algal suspension and suspended silt. After a feeding period of 60 days, all mussels fed exclusively with fish-waste showed a high decrease in dry-tissue weight and a relatively high mortality. With a mixture of waste water and suspended silt, the initial dry-tissue weight kept more of less constant. An increase of 32.9% was observed by feeding a mixture of waste water and algal culture. The highest increase in dry-tissue weight (169.4%) could be obtained by a combination of waste water, algal culture and suspended silt. (Katz)
W78-05612

FEASIBILITY OF SILVER-LEAD MINE WASTE MANIPULATION FOR MINE DRAINAGE CONTROL.
Montana Dept. of Natural Resources and Conservation, Helena. Engineering Bureau.
For primary bibliographic entry see Field 5G.
W78-05614

RECLAMATION OF SURFACE MINED COAL SPOILS,
Kentucky Agricultural Experiment Station, Lexington. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-05615

MINE DRAINAGE CONTROL FROM METAL MINES IN A SUBALPINE ENVIRONMENT: A FEASIBILITY STUDY.
Montana Dept. of Natural Resources and Conservation, Helena. Engineering Bureau.
For primary bibliographic entry see Field 5G.
W78-05618

TRANSPORT AND TRANSFER RATES IN THE WATERS OF THE CONTINENTAL SHELF,
Lamont-Doherty Geological Observatory, Palisades, NY.

For primary bibliographic entry see Field 5B.
W78-05627

COASTAL MORPHOLOGY, SEDIMENTATION AND OIL SPILL VULNERABILITY,
South Carolina Univ., Columbia. Div. of Coastal Research.
For primary bibliographic entry see Field 5G.
W78-05628

THE INTERACTION OF OIL WITH SEA ICE IN THE ARCTIC OCEAN,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-05629

DYNAMICS OF NEAR SHORE ICE,
Washington Univ., Seattle. Div. of Marine Resources.
For primary bibliographic entry see Field 5B.
W78-05631

BENTHOS-SEDIMENTARY SUBSTRATE INTERACTIONS,
Alaska Univ., College. Inst. of Marine Science.
C. M. Hoskin.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 17. Hazards, p 511-518, March 1977. 1 fig. 03-5-022-56.

Descriptors: *Benthos, *Sediments, *Baseline studies, Resources development, Alaska, Food chains, *Outer Continental Shelf, Bering Sea, Grain size, Petroleum development, Offshore operations.

Grain size parameters are correlated with abundance and species composition of the macrobenthos. Disturbance of interactions between macrobenthos and sediment may cause changes in the distribution and abundance of benthos. Because the benthos is a part of the food web which man harvests at various levels, changes in the benthos may affect the richness of the harvest. There are 9 stations having matching sediment and macrobenthos data from which the variations in grain size modes can be seen. Tabulation of macrobenthos species abundance from these stations has been done. No species is common to all 9 stations, and the data available are too sparse to warrant comment except that macrobenthos seems to be as variable as grain size modes. When macrobenthos data for the remaining 57 stations becomes available, correlations between sediments and benthos can be made. (See also W78-05222) (Sinha-OEIS)
W78-05643

5D. Waste Treatment Processes

PRODUCTIVITY AND NITROGEN BALANCE IN LARGE SCALE PHYTOPLANKTON CULTURES,
Woods Hole Oceanographic Institution, Woods Hole, MA.
C. F. D'Elia, J. H. Ryther, and T. M. Losordo.
Water Research, Vol 11, p 1031-1040, 1977. 9 fig, 1 tab, 21 ref. Also as: Woods Hole Oceanographic Institution Contribution No. 3882. SG-04-6-158-44016.

Descriptors: *Biomass, *Nitrogen, *Phytoplankton, *Tertiary treatment, *Sewage treatment, Aquaculture, Waste water treatment, Seasonal variations, Sewage treatment aquaculture system, Phaeodactylum tricornutum.

Biomass production and nitrogen balance was studied in 35,000 gal phytoplankton cultures comprising the first stage in a tertiary sewage treatment-mariculture system. The diatom Phaeodactylum tricornutum persisted for most of the study. At secondary sewage effluent loadings sufficient to produce residual dissolved inorganic nitrogen concentrations above approximately 5 microgram atoms 1 to the -1 power, and N:C ratio (molar) of 0.17 was obtained and algal growth was not nutrient-limited. Biomass levels, and hence pond particulate carbon and nitrogen output, varied in response to solar irradiance and dilution rate, but not temperature. An inverse relationship existed between algal biomass concentration and dilution rate, such that in late spring optimal pond yields occurred between 0.55 and 0.65 dilutions. Better than 95% dissolved total nitrogen removal was obtained. Net dissolved organic nitrogen production, that would offset dissolved inorganic nitroegn removal, did not occur. Pond particulate nitrogen output was usually less than dissolved total nitrogen removal. (NOAA)
W78-05205

PROCESS FOR PURIFYING WATER,
Degremont, Rueil-Malmaison (France). (Assignee).
For primary bibliographic entry see Field 5F.
W78-05236

PROCESS FOR PURIFYING WASTE WATER,
Hoeschst A.G., Frankfurt am Main (West Germany).
R. Klein, and J. Helberg.
U.S. Patent No. 4,052,301, 5 p, 1 fig, 3 tab, 8 ref; Official Gazette of the United States Patent Office, Vol 963, No 1, p 255, October 4,1977.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, Water pollution control, Industrial wastes, Chemical precipitation, Hydrogen ion concentration, Flocculation, Polyolefin production plant, Titanium and aluminum salts.

The waste waters of a polyolefin production plant are generaly first conveyed through a piping system into a waste water collecting tank, from where they are transferred to further waste water treatment installation, e.g., to the distillation plant for recovering alcohol. A serious disadvantage is the fact that in treatment plants a pH of the waste water of less than 10 has the titanium and aluminum salts, which are dissolved in the waste water, gradually build up linings inside the pipe walls. The object of the invention is to provide a further treatment for the waste water in such a way that the contamination of the main canal with titanium and aluminum salts will be kept as los as possible and that possibly an undesirably clogging of the pipes will be avoided. This problem is solved by adjusting the pH of the aqueous phase -- after having separated the polymer suspension--to from 4.5 to 9.5, preferably from 5 to 9 and by eliminating simultaneously the titanium and aluminum hydroxides which precipitate. The precipitation tendency and the settling speed of the hydroxides can be improved by the addition of suitable flocculation agents. (Sinha - OEIS)
W78-05242

SANITARY-TOXICOLOGICAL ASSESSMENT OF THE CAPROLACTAM PRODUCTION EFFLUENTS TREATED IN BIOLOGICAL INSTALLATIONS, (IN RUSSIAN),
Kemerovo State Medical Inst. (USSR).
For primary bibliographic entry see Field 5C.
W78-05248

HIGH PERFORMANCE LIQUID CHROMATOGRAPHIC DETERMINATION OF UNREACTED ACRYLAMIDE EMULSION OR AQUEOUS HOMOPOLYMERS OR EMULSION COPOLYMERS,
Petrolite Corp., St. Louis, MO. Tretolite Div.
For primary bibliographic entry see Field 5A.
W78-05270

ADSORPTION OF SOLVENTS ON ACTIVATED CARBON. ENVIRONMENTAL PROTECTION AND RECOVERY (ADSORPSJON AV LOSNINGMIDLER PA AKTIVT KULL. KOMBINER MILJOVERN MED LONNSOM GJENVINNING),
B. I. Flatgard.
Teknisk Ukeblad, Vol 124, No 45, p 20, 23-24, 1977. 2 fig.

Descriptors: *Activated carbon, *Adsorption, *Separation techniques, *Chemical wastes, *Industrial wastes, Solvents, Recycling, Waste water treatment.

The use of activated carbon to adsorb solvent vapors generated during industrial processes is described. Activated carbon, being apolar and having a large specific surface area, is suitable for the treatment of most industrial solvents. Activated carbon has an absorption capacity of 3-35 kg of solvent/100 kg. After completion of the adsorption cycle, the solvent is generally desorbed by steaming. The solvent vapor is separated from the steam by condensation, subsequent cooling, or water separation; the activated carbon is cooled and dried prior to reuse in the treatment process. (Takacs-FIRL)
W78-05271

REMOVAL OF PHENOL FROM WASTEWATERS IN GRID PLATE TYPE SCRUBBERS (OBSEFENOLIVANIE STOCHYNKH VOD V SKRUBBERAKH S RATELKAMI PROVAL'NOGO TIPA),
L. A. Vlasova, and M. V. Fisich.
Koks i Khimia, No 9, p 34-35, 1977. 1 tab.

Descriptors: *Chemical wastes, *Phenols, *Industrial wastes, *Sodium compounds, *Alkalis(Bases), Separation techniques, Absorption, Design data, Waste water treatment.

The desire to produce standard sodium phenolates containing at least 15% phenol and a maximum free alkali content of 8% made it necessary to reconstruct and add nine grid plates to existing steam injection scrubbers used to remove phenol from waste waters generated at a coking plant. Phenol was removed from the vapor phase by spraying with an alkaline solution. The efficiency of phenol separation was found to decrease with an increase in the molar ratio of phenols to sodium hydroxide in the circulating spray liquid which lead to desorption of the phenols. To increase the phenol separation efficiency, it was necessary to switch to multi-step spraying with liquid flow redistribution in the absorption zone of the scrubber. (Takacs-FIRL)
W78-05272

PHYSICOCHEMICAL PRINCIPLES OF THE OPTIMAL SELECTION OF NATURAL SORBENTS FOR THE ADSORPTIVE REMOVAL OF SURFACE-ACTIVE SUBSTANCES FROM WASTEWATER (FIZIKO-KHIMICHESKIE PRINTSIPY RATIONAL NOGO PODBORA PRIRODNYKH SORBENTOV DLIA ADSORBTSIONNEI OCHISTKI STOCHNYKH VOD OT POVERKHNOSTNO-AKTIVNYKH VESHCHESTV),
I. I. Tar-sevich.
Ukrainskii Khimicheskii Zhurnal, Vol 43, No 9, p 930-935, 1977. 3 fig, 19 ref.

Descriptors: *Adsorption, *Clays, *Surfactants, *Separation techniques, *Montmorillonite, *Kaolinite, Industrial wastes, Textiles, Effluents, Hydrogen ion concentration, Chemical wastes, Waste water treatment.

The suitability of natural adsorbents, such as clay minerals, for the removal of surfactants from waste water is discussed. Montmorillonite is recommended for the treatment of textile industry wastes which may contain nonionic surfactants,

such as isooctylphenol polyethyleneglycol ester. Various clay minerals, especially montmorillonite and vermiculite, can also be used for the adsorption of cation-active surfactants, such as dodecylammonium chloride. The sorption of cationic surfactants on polar sorbents is pH-dependent, making it possible to increase the cation exchange capacity of montmorillonite from 0.71 to 1.07 mg-equivalents/g by increasing the pH from 7 to 9.6-9.8. The adsorption of anionic surfactants on kaolin and other clay minerals is a rather complex process, where the van-der-Waals interaction also plays an important role. Palygorskite is considered best suited for the adsorption of anionic surfactants from waste water. (Takacs-FIRL)
W78-05273

OXIDATION OF CERTAIN DIALKYLDITHIOCARBAMATES IN DILUTE AQUEOUS SOLUTIONS (OKISLENIE NEKOTORYKH DIALKILDITIOKARBAMATOV V RAZBAVLENNYKH VODYNKH RASTVORAKH),
P. N. Taran, and V. M. Marchenko.
Ukrainskii Khimicheskii Zhurnal, Vol 43, No 10, p 1030-1032, 1977. 1 fig, 1 tab, 7 ref.

Descriptors: *Thiocarbamate pesticides, *Oxidation, *Chemical wastes, *Industrial wastes, *Chlorination, Ozone, Ultraviolet radiation, Waste water treatment, Waste treatment.

Hydrogen peroxide, potassium permanganate, chlorine, ozone, and ultraviolet radiation were evaluated as oxidants of ziram and TMTD in water at concentrations of 2 and 12 mg/liter, respectively. Ziram was oxidized completely by all of the agents tested, although the oxidation product was identified as the more toxic TMTD. Hydrogen peroxide and potassium permanganate were not effective in oxidizing TMTD. Complete oxidation of TMTD was achieved by the application of chlorine at a concentration of 7.5 mg/mg, by ozine at 3.3 mg/mg, and by ultraviolet irradiation. (Takacs-FIRL)
W78-05274

HYGENIC ASSESSMENT OF THE THERMAL DECOMPOSITION OF THE ACRYLATES PRODUCTION WASTES,
M. L. Lubyansky, M. M. Levina, V. M. Blagodatin, G. V. Sudkova, and G. I. Kuzmina.
Gigiena i Sanitariya, Vol 8, p 43-46, 1977. 2 tab.

Descriptors: *Thermal properties, *Fused salts, Industries, *Industrial wastes, *Degradation(Decompostion), Chemical wastes, Water pollution control, Smoke, Waste water treatment.

Health aspects of the treatment of wastes from acrylate manufacturing by thermal decomposition were evaluated. The study indicated that more hygenic conditions could be achieved for the thermal decontamination of the acrylate wastes. It was recommended that scientific data on the properties of the combustion products be considered in the design of production and treatment facilities. Smoke gases, discharged with the combustion products, and the toxicity of fusible salts produced during the process were suggested as significant factors for consideration in designing installations. (Lisk-FIRL)
W78-05275

ALONG THE WATER CLEANUP ROAD.
For primary bibliographic entry see Field 5G.
W78-05276

METHOD FOR TREATING WASTE WATER,
Asahi Kasei Kogyo Kabushiki Kaisha, Osaka (Japan). (Assignee).
Y. Tagashira, H. Tagaki, K. Inagaki, K. Ishii, and O. Hiroyuki.
United States Patent 4,070,281. Issued January 24, 1978. Official Gazette of the United States Patent Office, Vol. 966, No 4, p 1491, January, 1978.

Descriptors: *Carbon, *Nitrogen, *Chemical wastes, *Patents, *Industrial wastes, Oxidation, Decomposing organic matter, Copper, Chemical degradation, Design data, Waste water treatment.

An oxidation system has been patented for the removal of inorganic cyanide from organic waste water. A wet oxidation process is used in conjunction with a copper compound and an ammonium salt to oxidize the cyanide-bearing waste water at a temperature of 175-300C and a pressure of 20-150 kg/sq cm. The oxidized waste is then separated into oxidized liquid and gas; the liquid is then treated with an oxygen-generating substance. This step effects the oxidation-decomposition of the inorganic cyanide remaining in the liquid to carbon dioxide and nitrogen. The copper remaining in the oxidized liquid is then extracted. The ammonium salt used in the initial wet oxidation process may be an ammonium sulfate, ammonium nitrate, ammonium sulfamate, ammonium hydrogencarbonate, ammonium chloride, ammonium iodide, ammonium formate, ammonium acetate, ammonium oxalate, or ammonium hydrogen-tartrate. (Lisk-FIRL)
W78-05277

REGENERATION OF SPENT SULFURIC ACID (REGENERATION VON ABFALLSCHWELSAEURE),
Hoechst A. G., Frankfurt am Main (West Germany).
K. Bondenbenner, H. Plessen, and R. Steiner.
Chemie Inginieur Technik, Vol 50, No 1, p 30-36, 1978. 7 fig, 163 ref.

Descriptors: *Electrolysis, *Chemical wastes, *Sulfur compounds, *Inorganic compounds, *Organic compounds, Separation techniques, Waste water treatment, Equipment, Industrial wastes.

The recovery of sulfuric acid from spent solutions can be accomplished by several processes, including electrolysis. Spent sulfuric acid solutions containing at least 20% sulfuric acid are usually preconcentrated to a sulfuric acid concentration of 60-70% concentration is further concentrated to 90% for sulfuric acid regeneration or is decomposed to sulfur dioxide with simultaneous purification processes. Electrolysis is often used to remove contaminating organic or inorganic compounds from spent sulfuric acid solutions before regeneration of sulfuric acid from dilute spent sulfuric acid baths with an acid concentration of less tha 20% can be accomplished. However, increased evaporation of the solution contributes to significant cost increases as the sulfuric acid concentration decreases. (Lisk-FIRL)
W78-05279

CONTROL OF MERCURY FROM KJELDAHL WASTES,
Western Regional Research Lab., Berkeley, CA.
E. Hautala, and G. M. McDonald.
Journal of the Association of Official Analytical Chemists, Vol 61, No 1, p 208-209, 1978. 1 fig, 7 ref.

Descriptors: *Mercury, *Chemical wastes, *Calcium carbonate, *Sodium sulfate, *Hydrogen sulfides, Industrial wastes, Water pollution sources, Waste water treatment, Separation techniques, Filtration.

The concentration of mercury in Kjeldahl waste solutions is reduced by treatment with calcium carbonate and sodium sulfite to yield an insoluble and filterable mercury compound. The waste water is first neutralized to pH 7.0 with sulfuric acid, followed by the addition of enough sodium sulfite to produce a hydrogen sulfite odor. Calcium carbonate is added to the waste liquid and to the filter through which the solution is separated. Filtration with calcium carbonate produces insoluble mercury sulfide and a disposable filtrate. The filtrate contains a residual mercury content ranging 0.04-0.07 ppm. Without the addtional treatment of calcium carbonate as a filter aid, filtrates are not uniformly clear or consistently low in mercury content. Initial neutralization of the waste solution effectively reduces the mercury content of 18-hour settled effluent from 0.35 to 0.05 ppm and of sludge filtrate from 0.05 ppm to nearly no residual mercury. (Lisk-FIRL)
W78-05280

BIOLOGICAL TREATMENT SOLVES LOW TEMPERATURE WASTEWATER PROBLEMS,
Reichold Chemicals Ltd., Sainte Therese (Quebec).
C. Charette, and J. Herbineaux.
Industrial Wastes, Vol. 24, No. 1, p 30, 32-33, January-February, 1978. 1 fig, 2 tab.

Descriptors: *Biological treatment, *Activated sludge, *Microbiol degradation, *Chemical industry, *Chemical wastes, Aeration, Aerated lagoons, Ammonia, Phenols, Waste water treatment, Industrial wastes.

A waste water system has been developed at the Reichhold Chemicals Limited plant in Quebec, Canada, which maintains biological activity in the treatment process during low winter temperatures. A biological treatment system for wastes from the manufacture of phenolic, urea-formaldehyde, alkyd, and polyester resins was modified to enhance the activity of the microorganisms during the winter months. A 10-hp aerator in the first equalization basin was converted to a 25-hp submerged turbine; two 25-hp aerators in the second biological treatment basin were converted to 40-hp submerged turbine units. Air was injected into the aeration cell by two 50-hp blowers; an integral clarifier was installed at the outlet of the aeration tank. A high flow rate was created by the aerators; sludge was returned to the ports from the sludge scraper located along the clarifier. An additional unit was installed to monitor and control pH, phenol, formaldehyde, phosphate, ammonia, COD, and nitrites-nitrates. By lowering the pH to 7.4, efficient biological activity was maintained during the winter months when temperatures fell as low as -28C. BOD levels in the treated wastes were reduced by 97.8% and COD was reduced by 93.6%. Phenol, formaldehyde, ammonia, and orthophosphate concentrations were reduced to the levels acceptable for discharge into a municipal waste water treatment facility. (Lisk-FIRL)
W78-05281

TOXIC WASTE TREATED BY WASTE RECOVERS USABLE CHEMICALS.
Engineering News-Record, Vol. 200, No. 9, p 14, March, 1978.

Descriptors: *Toxins, *Chemical wastes, *Recycling, *Chemical treatment, *Fuels, Electronics, Alcohols, Waste water treatment, Industrial wastes, Treatment facilities, Carbon filters.

Chemical recovery from toxic wastes by treatment with other chemical wastes will be practiced by a waste treatment plant in Newark, New Jersey. The chemical treatment process will allow the recovery to resaleable chemicals and fuels, such as alcohol from electronics industrial effluent. The hazardous materials will be recycled and the residues neutralized and stored in landfills in New York and Illinois. The plant will have a 100,000 gal/day capacity when it opens in May, with provisions for a future capacity of 500,000. The treatment system was developed by Earthline Co, a subsidiary of SCA Services, Inc of Boston, Massachusetts. The plant is expected to eliminate much of the illegal disposal of raw waste that has been occurring. West scrubbers and carbon filters

will be installed to eliminate particulate emissions from the recovery process. (Lisk-FIRL)
W78-05282

PROCESS FOR TREATMENT OF WASTE WATER EXHAUSTED FROM WATER-WASH SPRAY BOOTH USING WATER-SOLUBLE PAINT,
Nippon Paint Co. Ltd., Tokyo (Japan). (Assignee).
T. Inoue, M. Kimura, and H. Matuda.
United States Patent 4,071,449. Issued January 31, 1978. Official Gazette of the United States Patent Office, Vol. 966, No. 5, p 1874, January, 1978.

Descriptors: *Paints, *Coagulation, *Alkalis(Bases), *Acids, *Patents, Separation techniques, Salts, Solubility, Adhesion, Waste water treatment, Industrial wastes.

A treatment process for the removal of uncoagulated, water-soluble paint from waste water has been patented. The waste water discharged from a water-wash spray booth is treated with an acidic agent followed by an alkaline agent. The pH of the waste water is maintained at pH 6.0-9.0; the addition of the acid and alkali causes the formation of an insoluble or partially soluble salt. The water-soluble paint is then precipitated from solution as a non-adhesive coagulation product. The acidic and alkaline agents are added to sufficient amounts to bring about coagulation of the water-soluble paint in the wash water effluent. The non-adhesive, coagulation product can then be removed from the waste water after the liquid-solid separation treatment. (Lisk-FIRL)
W78-05283

METHOD FOR TREATMENT OF CYANIDE-CONTAINING WASTE WATER,
Mitsu Toatsu Chemicals, Inc., Tokyo (Japan). (Assignee).
H. Watanabe, K. Toyoshima, M. Noutomi, and H. Yamakawa.
United States Patent 4,071,448. Issued January 13, 1978. Official Gazette of the United States Patent Office, Vol. 966, No. 5, p 1874, January, 1978.

Descriptors: *Nitrogen compounds, *Chemical wastes, *Patents, *Chemical reactions, *Aeration, Industrial wastes, Incineration, Separation techniques, Waste water treatment.

A patent has been issued for a waste water treatment process which removes cyanide and recovers metals. The waste water is first mixed with formaldehyde at a ratio of 1.0-1.3 moles of formaldehyde per mole of cyanide compound. The mixture is immediately heated to a temperature of 300-1200C in an atmosphere containing oxygen. Sufficient oxygen is provided to yield an oxygen content in the exhaust gases of 2-11% by volume. The water and volatile materials are evaporated and the cyano-containing compounds are incinerated. The metals contained in the waste water can then be recovered as solids. (Schulz-FIRL)
W78-05284

FIRST BOC INDUSTRIAL TREATMENT UNIT.
Water and Waste Treatment, Vol. 20, No. 11, p 11-12, November, 1977.

Descriptors: *Oxygenation, *Biochemical oxygen demand, *Food processing industry, *Aeration lagoons, *Aeration, Industrial wastes, Waste water treatment, Activated sludge, Biodegradation, Sewage treatment.

The largest industrial waste treatment plant in England to use BOC Ltd's oxygenation system is discussed. The Vitrox oxygenation system, designed by BOC Ltd. of England, was installed at the Whitworth Holdings Ltd's food processing operation in Irthlingborough, Northamptonshire, for a pilot plant study. The processing plant has achieved full output with two aeration tanks assisted by Vitrox systems and has been estimated as resulting in substantial capital savings. Biological oxygen demand was automatically controlled by maintenance of the dissolved oxygen content in the effluent by oxygen addition. Sludge bulking was prevented when the aeration systems were overloaded with the use of supplementary oxygen supplied automatically by the Vitrox system. The system suplies oxygen during peak flows when the aeration tanks have reached their 75% normal load capacity. (Lisk-FIRL)
W78-05286

BOC EFFLUENT TREATMENT FOR BOD.
Processing, Vol. 23, No. 11, p 9, November, 1977.

Descriptors: *Oxygenation, *Biochemical oxygen demand, *Food processing industry, *Aeration lagoons, *Aeration, Industrial wastes, Waste water treatment, Activated sludge, Biodegradation, Sewage treatment.

An oxygenation system used in the treatment of effluent from a food processing plant is evaluated. The Vitrox oxygenation system, manufactured by BOC Ltd of England, has been found to increase the capacities of the two aeration tanks in operation. It was estimated that the Vitrox system could be provided at half the cost of a bio-tower system. The BOC Vitrox system controls the dissolved oxygen content in the effluent, preventing BOD overloads. The system also assists conventional aeration systems when oxygen demand exceeds the aerators' capabilities. A portion of the effluent is initially extracted and oxygenated by the Vitrox system. Breakdown of the incorporated oxygen to produce microbubbles occurs under pressure and assists biodegradation. An activated sludge aerator tank with a 75% normal flow capacity was assisted by an automatic Vitrox system in the food processing industry examined. (Lisk-FIRL)
W78-05287

PHOTOSYNTHETIC BACTERIA IN WASTE TREATMENT--MIXED CULTURE STUDIES WITH RHODOPSEUDOMONAS CAPSULATA,
New South Wales Univ., Kensington (Australia). School of Biological Technology.
H. Sawada, and P. L. Rogers.
Journal of Fermentation Technology, Vol. 55, No. 4, p 311-325, 1977. 9 fig, 4 tab, 30 ref.

Descriptors: *Biological treatment, *Bacteria, *Laboratory tests, *Growth rates, *Organic acids, Photosynthetic bacteria, Biochemistry, Cultures, Chemical oxygen demand, Dissolved oxygen, Light, Biochemical oxygen demand, Waste water treatment.

Interactions between Rhodopseudomonas capsulata and a Klebsiella species in mixed cultures on glucose media were examined in an effort to define the photosynthetic bacteria's role in treating high BOD wastes. A one-liter controlled culture vessel was used for both batch and continuous cultures. The Klebsiella converted glucose into volatile fatty acids, which were then utilized by Rhodopseudomonas capsulata. The autolysis of Klebsiella cells stimulated growth of Rhodopseudomonas capsulata. Light-energy limitation was more likely at higher rates of dilution when the energy needs of photosynthetic bacteria were also higher. Dissolved oxygen tension (DOT) was critical; 1% air saturation was optimal for Rhodopseudomonas capsulata growth and COD reduction. Maximal Rhodopseudomonas capsulata growth for single-stage continuous culture occurred at dilution rates under 0.10/hr. More volatile fatty acids were assimilated in a two-stage continuous culture when the residence time in the second stage was longer. (See also W78-05289) (Snyder-FIRL)
W78-05288

PHOTOSYNTHETIC BACTERIA IN WASTE TREATMENT--PURE CULTURE STUDIES WITH RHODOPSEUDOMONAS CAPSULATA,
New South Wales Univ., Kensington (Australia). School of Biological Technology.
H. Sawada, and P. L. Rogers.
Journal of Fermentation Technology, Vol. 55, No. 4, p 297-310, 1977. 5 fig, 8 tab, 36 ref.

Descriptors: *Biological treatment, *Photosynthetic bacteria, *Nutrient requirements, *Growth rates, *Biochemical oxygen demand, Cultures, Laboratory tests, Light intensity, Dissolved oxygen demand, Industrial wastes, Food processing industry, Trace elements, Amino acids, Chemical oxygen demand, Waste water treatment.

Laboratory studies were conducted to select a typical strain of bacteria found in industrial and agricultural waste waters and to determine its optimal growth conditions in pure-batch and continuous cultures. Rhodopseudomonas capsulata, a typical photosynthetic bacterium, was used in batch culture studies on the nutrient requirements for bacterial growth, including carbon, vitamin, amino acid, and trace element requirements. The studies revealed that the growth of R. capsulata on lower fatty acids could be promoted by the addition of a yeast extract to the culture. Certain vitamins, trace elements, and amino acids were required in addition to the carbon source, growth-promoting substrates, and basal salts. The dilution rate, illumination intensity, and dissolved oxygen tension were observed to control the degree of photosynthetic activity and the subsequent reduction of COD in the effluent. (See also W78-05288) (Snyder-FIRL)
W78-05289

FISH BY-PRODUCTS--FISH MEAL AND FISH SILAGE,
Ministry of Agriculture, Fisheries and Food, Hull (England). Humber Lab.
For primary bibliographic entry see Field 5E.
W78-05291

HOW THE NEW PLANT WORKS.
Cubelet Press, Vol 43, No 1, p 5, January, 1978.

Descriptors: *Biological treatment, *Treatment facilities, *Food processing industry, *Automatic control, *Water reuse, Industrial wastes, Industrial water, Microorganisms, Waste water treatment.

The California and Hawaiian Sugar Company has recently installed a 1.8 mgd biological treatment system to renovate water from its Crockett Refinery and from the adjacent Crockett-Valona Sanitary District. Nitrogen and phosphoric acid are added to the waste water in a 3.5 million-gal surge tank to promote the growth of nutrient-removing microorganisms. The waste water is then pumped to three 1,000,000-gal reactor tanks where it is mixed by turbines and oxygenated to promote microbial activity. Sludge is removed in clarifiers and centrifuged prior to disposal. Water which is not reused in refinery operations is discharged into the Carquinez Strait through an outfall/diffuser system for dilution with San Francisco Bay waters. A computerized control system monitors flow rates, nutrient requirements, process unit operation, and treated water quality. (Schulz-FIRL)
W78-05292

TREATMENT OF EFFLUENTS FROM AMMONIA PLANTS--PART I--BIOLOGICAL NITRIFICATION OF AN INORGANIC EFFLUENT FROM A NITROGEN-CHEMICALS COMPLEX,
Natal Univ., Durban (South Africa). Dept. of Chemical Engineering.
F. G. Neytzell-de Wilde.
Water SA, Vol 3, No 3, p 113-122, July, 1977. 8 fig, 4 tab, 7 ref.

Descriptors: *Ammonia, *Chemical wastes, *Nitrification, *Mathematical models, *Industrial wastes, Chemical oxygen demand, Sludge treatment, Suspended solids, Waste water treatment.

The treatment of effluents from ammonia plants is considered with respect to the biological nitrification of an inorganic effluent from a nitrogen-chemicals complex. The conditions for the biological oxidation of ammonia in an inorganic effluent containing high levels of ammonia and nitrate were investigated in continuous tests. The treatment process is described in four parts: the biological nitrification of an inorganic effluent from a nitrogen-chemicals complex; biological oxidation of carbon-one compounds (amines and methanol) in an effluent from a reforming plant serving an ammonia complex; ozonation of amines in an effluent from a reforming plant serving an ammonia complex; and biological denitrification of an inorganic effluent from a nitrogen-chemicals complex. A series of equations are presented for the relationship between sludge age and unoxidized substrate, and for the calculation of volatile suspended solids levels, oxygen consumption, acid production, and the required retention time. (See also W78-05294 thru W78-05296) (Baker-FIRL)
W78-05293

TREATMENT OF EFFLUENTS FROM AMMONIA PLANTS--PART II--BIOLOGICAL OXIDATION OF CARBON-ONE COMPOUNDS IN AN EFFLUENT FROM AN AMMONIA PLANT,
Natal Univ., Durban (South Africa). Dept. of Chemical Engineering.
F. G. Neytzell-de Wilde, and J. Groves.
Water SA, Vol 3, No 3, p 123-132, July, 1977. 6 fig, 1 tab, 33 ref.

Descriptors: *Ammonia, *Biological treatment, *Oxidation, *Sludge treatment, *Chemical wastes, Industrial wastes, Odor, Microorganisms, Waste water treatment.

The treatment of effluents from ammonia plants is considered with respect to the biological oxidation of carbon-one compounds. The conditions for the biological oxidation of mono-, di, and trimethylamine and methanol present in a condensate from an ammonia synthesis gas stream have been investigated in continuous units. The amines were completely decomposed to ammonia and carbon dioxide and the methanol to carbon dioxide. At high flow rates and short sludge retention times, very little ammonia was converted to nitrates and nitrates and nitrosoamine was detected. The biomas produced contained a high protein content and a satisfactory balance of amino acids and may prove useful as a source of single cell protein. (See also W78-05293) (Baker-FIRL)
W78-05294

TREATMENT OF EFFLUENTS FROM AMMONIA PLANTS--PART III--- OZONATION OF AMINES IN AN EFFLUENT FROM A REFORMING PLANT SERVING AN AMMONIA COMPLEX,
Natal Univ., Durban (South Africa). Dept. of Chemical Engineering.
F. G. Neytzell-de Wilde.
Water SA, Vol 3, No 3, p 133-141, July, 1977. 9 fig, 2 tab, 22 ref.

Descriptors: *Ammonia, *Oxidation, *Ozone, *Chemical wastes, *Industrial wastes, Odor, Chemical reactions, Design data, Air pollution, Waste water treatment.

The treatment of effluents from ammonia plants is discussed with emphasis on the ozonation of amines in an effluent from a reforming plant serving an ammonia complex. The process condensate which arose from a reforming plant contained methylamines, ethanol, and ammonia. Ozone was evaluated for the oxidation of the methylamines in aqueous solutions. Trimethyamine in the nonionized form reacted most readily with ozone. Good solutions. Trimethylamine in the nonionized form reacted most readily with ozone. Good conversion of trimethylamine to an odorless oxidation product was achieved with a 1:1.5 ratio of amine to ozone when ozone when ozone was passed into a packed tower through which an alkaline solution of the amine was flowing. Dimethylamine and monomethylamine did not react as readily. The composition of the industrial effluent was such that the pH was buffered in the range 8.5-8.7. Effective ozonation of the amines was not possible without the addition of a considerable amount of alkali. Although trimethylamine was effectively reduced by the treatment process, odors contributed by the remaining monomethylamine and dimethylamine fractions were still considered objectionable. (See also W78-05293) (Baker-FIRL)
W78-05295

TREATMENT OF EFFLUENTS FROM AMMONIA PLANTS, PART IV--DENITRIFICATION OF AN INORGANIC EFFLUENT FROM A NITROGEN-CHEMICALS COMPLEX USING METHANOL AS CARBON SOURCE,
Natal Univ., Durban (South Africa). Dept. of Chemical Engineering.
F. G. Neytzell-de Wilde, G. R. Nurse, and J. Groves.
Water SA, Vol 3, No 3, p 142-154, July, 1977. 9 fig, 4 tab, 21 ref.

Descriptors: *Ammonia, *Chemical wastes, *Denitrification, *Microorganisms, *Industrial wastes, Odor, Sludge treatment, Organic wastes, Waste water treatment.

The treatment of effluents from ammonia plants is considered with respect to the denitrification of an inorganic effluent from a nitrogen-chemicals complex using methanol as a carbon source. Careful consideration of various physico-chemical and biological treatment methods led to the conclusion that bacteial nitrification followed by denitrification was the most suitable method for nitrogen removal. Studies on the denitrification of nitrified effluent containing approximately 2800 mg/liter nitrate-nitrogen are described. Methanol was used as the carbon and energy source because it is completely oxidized to carbon dioxide and water and does not directly increase the COD or BOD of the resulting effluent. Methanol is also completely miscible with water; its composition is constant; and the stoichiometry of the reactions is relatively straight forward. Optimum results were obtained by denitrifying a fully nitrified effluent to which a portion of original effluent containing both nitrate-N and ammonia-N had been added to yield a concentration of ammonia-N which was required for assimilation only. Operation under these conditions yielded the best methanol: total-N ratio, although the microbial yield was greater. Free hydrogen sulfide was toxic to bacteria but could be controlled by operating with a small nitrate residual and no methanol present in the effluent. Equations were derived, based on the Monod relation, for the denitrification reaction. (See also W78-05293) (Baker-FIRL)
W78-05296

CLEANING WATER BY ULTRAFILTRATION...AN OVERVIEW OF SYSTEM REQUIREMENTS AND CAPABILITIES,
Permutit Co., Inc., Paramus, NJ.
E. J. Connelley.
Plant Engineering, Vol 31, No 23, p 145-147, November, 1977. 6 fig.

Descriptors: *Membrane processes, *Reverse osmosis, *Industrial wastes, *Tertiary treatment, *Water reuse, Recycling, Costs, Membranes, Filtration, Design data, Waste water treatment, *Ultrafiltration.

Ultrafiltration has been used in the diary industry primarily to treat wastewater and recover cheese byproducts and in the chemical industry to upgrade process water. The process may play a key role in most industrial water and wastewater treatment systems as the environmental regulations get tougher. Ultrafiltration is essentially a pressure-sensitive process. It can be defined as planned fouling. The more foulants in the water, the lower the operating flux and the more expensive the system will be. Selection criteria used to determine the limitations and requirements of an ultrafiltration system are discussed. Descriptions of the three types of membranes used in ultrafiltration systems are given. These three types include: hollow-tube membranes, spiral-wound membranes, and hollow-fiber membranes. Costs of ultrafiltration equipment are dropping as production volume increases. Generalizations regarding pricing are considered. (Baker-FIRL)
W78-05297

MONITORING CONTINUOUSLY THE OXYGEN DEMAND OF INDUSTRIAL EFFLUENT AND SURFACE WATERS,
Philips Gloeilampenfabrieken N.B., Eindhoven (Netherlands). Application Lab.
For primary bibliographic entry see Field 5A.
W78-05298

MEETING 1983 EFFLUENT REQUIREMENTS.
For primary bibliographic entry see Field 5G.
W78-05299

OMC-LINCOLN MEETS TOUGH DISCHARGE ORDINANCE.
For primary bibliographic entry see Field 5G.
W78-05300

MECHANICAL PLATING,
Cadmium Association, London (England).
M. S. White.
Product Finishing, Vol. 30, No. 10, p 9-10, 14, October, 1977. 2 fig, 1 tab.

Descriptors: *Cadmium, *Chromium, *Zinc, *Lead, *Lime, Sodium compounds, Industrial wastes, Waste water treatment, Chemical precipitation, Metals.

A mechanical plating process has been designed to produce low amounts of effluent requiring treatment. Small components were plated with cadmium, zinc, tin, and lead powders in a rotating barrel with glass beads, aqueous activator, and promoter chemicals. The effluent produced by this plating process contained weak acids, high iron concentrations, and coating matter. By raising the pH of the waste water solution to 8.5 with the addition of slaked lime or sodium hydroxide, metals were precipitated. The pH of the solution had to be raised to 10.5 for cadmium precipitation. The settled sludge contained insoluble metal hydroxides. It was necessary to chemically pretreat chromium ions before precipitation. Mechanical plating was not found to produce metal complexes, toxins, or spray from the rotating barrel. (Lisk-FIRL)
W78-05301

NEW WAYS TO TREAT ELECTROLESS COPPER EFFLUENTS.
Products Finishing, Vol. 42, No. 4, p 81-82, January, 1978.

Descriptors: *Copper, *Lime, *Sulfides, *Heavy metals, *Chemical wastes, Waste water treatment, Industrial wastes, Copper sulfate, Sulfur compounds, Waste water disposal.

Two new methods to treat electroless copper effluents that significantly reduce the heavy metal content are described. Complexes formed during electroless copper plating are resistant to some

conventional effluent treatment methods. Other methods, such as sulfide precipitation, produce toxic fumes or unacceptable residues. Iron-bearing effluent and large quantities of sludge are produced with ferrous lime treatment; lime precipitation is most effective for Ethylenediaminetetraacetic acid (EDTA) treatment. The first method involves the addition of a 37% formalin solution and 50% sodium hydroxide solution to the combined bath and wash to produce an overall formaldehyde-sodium hydroxide concentration of 2.5 g/liter formaldehyde and 6 g/liter NaOH. A seeder added during agitation provides catalyzed carbon particles to which copper and othe heavy metals attach. The particles settle and the supernatant is then decanted for subsequent reuse. Organic sulfur compounds with high molecular weight are added to the effluent during the second stage of treatment. Polyelectrolytes added during agitation of the effluent, which has been adjusted to pH 5-7, assist in the precipitation of copper and other heavy metals. The residual sludge is dewatered and disposed of in a landfill. Both methods result in an effluent with a heavy metal content of 1 ppm or less. (Lisk-FIRL)
W78-05302

ELECTROLYTIC TREATMENT OF ACIDIC COPPER EFFLUENTS IN PARTICULATE ELECTRODE CELLS,
University of the Witwatersrand, Johnannesburg (South Africa). Dept. of Chemical Engineering.
A. W. Bryson, S. W. Orchard, and P. W. E. Young.
Water SA, Vol. 3, No. 1, p 9-11, January, 1977. 1 tab, 2 fig, 6 ref.

Descriptors: *Electrolysis, *Metals, *Copper, *Electrodes, *Permselective membranes, Industrial wastes, Electro-osmosis, Chemical wastes, Design data, Equipment, Waste water treatment.

Two types of particulate electrode cells, the fixed porous electrode and the fluidized bed electrode, have been developed for the treatment of dilute acidic effluents from the electroplating industry which contain copper sulfate. The power efficiencies of both electrode cells are reported as sufficiently high to make them feasible for use in the treatment of spent rinse water. The fixed porous electrode consists of a randomly packed bed of lead cylinders which act as a cathode and a lead sheet as an anode separated from the cathode by an anion-permeable membrane. Copper-coated glass spheres comprise the cathode in the fluidized bed electrode which also contains a lead anode and an anion - permeable membrane. Although the fluidized bed is considered more efficient, fairly tight control of the flow rate is required and the maximum height of the bed is limited to about 1 m with existing membranes. Greater heights would require the cell to be split into two or more beds with interstage pumping. Concentrations of sulfuric acid in the effluent as high as 1 g/liter are not expected to limit the use of the electrodes; mixing of a portion of the anolyte exit stream with the incoming effluent is suggested for situations where the sulfuric acid concentration is below 1 g/liter. (Baker-FIRL)
W78-05304

PLASTIC ROTARY PUMP PROVIDES 20 YEARS OF SERVICE.
For primary bibliographic entry see Field 8G.
W78-05305

ELECTRODIALYSIS IN ADVANCED WASTE WATER TREATMENT,
Ben-Gurion Univ. of the Negev. Beersheba (Israel). Office of Research and Development.
E. Korngold, K. Kock, and H. Strathmann.
Desalination, Vol. 24, No. 1-3, p 129-139, January, 1978. 6 fig, 1 tab, 4 ref.

Descriptors: *Electrodialysis, *Copper, *Salts, *Phosphates, *Desalination, Separation techniques, Membrane processes, Water purification, Industrial wastes, Waste water treatment, Recirculated water.

Laboratory and pilot plant studies were conducted to examine the application of electrodialysis to a variety of industrial waste water effluents with low salt concentrations and few membrane fouling components, such as organic materials or charged particles with high molecular weights. The technical and economic feasibility of electrodialysis treatment was considered for the following industrial waste waters: chemical copper plating, chemical plating, electro-plating, phosphate plating, and sulfuric acid pickling. Electrodialysis of chemical copper plating baths removed sodium sulfate and formate, along with removal of 1.25 g copper/kg sodium sulfate. Formaldehyde and ethylenediaminetetraacetic acid concentrations were relatively unaffected. Electrodialysis of rinse water from chemical plating produced a copper concentration of 6 g of copper/liter of brine from 2.3 cu m rinsing water. Electroplating rinsing water contains a salt concentration of 1.0-2.0%, while electrodialysis efficiency requires salt concentrations ranging from 0.01-0.5 moles/liter. A membrane area of 240 sq m would be required to treat one cu m of rinse water. Zinc ion concentrations in phosphate plating rinse water were reduced from 6.5 ppm to <1 ppm by electrodialysis. A recovery of 60-70% of sulfuric acid from pickling solutions was achieved by electrodialysis. One cu m of rinse water yielded 6.5 kg of sulfuric acid after electrodialysis treatment. (Lisk-FIRL)
W78-05306

SULPHURIC ACID PICKLING PROCESS FOR BRASS WITH SLIGHT POLLUTION EFFECTS (UMWELTFREUNDLICHES BEIZVERFAHREN FUER MESSING IN SCHWEFELSAEURE),
K. E. Knipps.
Metal, Vol. 32, No. 1, p 53-55, January, 1978. 1 fig.

Descriptors: *Copper, *Zinc, *Electrolysis, *Metals, *Anion exchange, Filtration, Waste water treatment, Recirculated water, Industrial wastes, Sodium compounds.

A method has been developed for the in-process regeneration of sulfuric acid pickling liquor for brass and standing rinse waters. The simulataneous in-process regeneration system produces a clear bath and a highly effective pickling liquor. At low acid concentrations, the pickled brass products maintain a high quality copper surface that is free of cementation due to the low metal content. Copper is recovered from the pickling liquor by filtration and electrolysis. Zinc is filtered from the rinsing water and is regenerated with sodium hydroxide in an anion exchange column. The zinc then undergoes electrolysis and is returned to the standing rinse water. Crystalline sodium sulfate is also recovered during the regeneration and preparation process; no hydroxide is recovered. Water consumption is reduced by the use of the demineralized circulation water. (Lisk-FIRL)
W78-05307

GUIDELINES ISSUED FOR METAL FINISHING EFFLUENTS.
For primary bibliographic entry see Field 5G.
W78-05308

PLATING SYSTEM CUTS POLLUTION WOES.
Chemical Engineering, Vol. 85, No. 5, p 87, February, 1978. 1 tab.

Descriptors: *Cadmium, *Sulfates, *Lime, *Metal, *Chemical precipitation, Zinc, Copper, Iron, Stainless steel, Waste water treatment, Industrial wastes, Viscosity, Electrolysis.

A Cadvert sulfate cadmium plating process, developed by 3M Co, simplifies the treatment of plant effluents and reduces cadmium concentrations required for plating. The system consists of a mixture of Cadvert-374 and -275, cadmium oxide, sulfuric acid, and water maintained at an optimum plating temperature of 72F. With this system, cadmium plating can be performed on a variety of metals, including stainless steel without prior nickel striking. Carbonitrided steel plating with cadmium can be accomplished by the addition of fluoroboric acid to the Cadvert solution. Cadmium requirements for the plating solution can be reduced from 2-6 oz/gal of solution for cyanide cadmium plating to 2 oz/gal with Cadvert plating. Dragout losses are reduced because the solution is less viscous; break-in electrolysis is eliminated with this plating system. Effluent treatment involves raising the solution to pH 10.5 with lime or caustic to precipitate cadmium and neutralizing the effluent before disposal. Since the Cadvert is acidic, corrosion-resistant tanks constructed of polypropylene or polyethylene are required. (Lisk-FIRL)
W78-05309

INVESTIGATIONS INTO DEHYDRATION OF DEPOSITS FROM THE PURIFICATION PLANT FOR GRINDING WASTE MATERIAL OF CRYSTAL GLASS MANUFACTURING PLANTS (BADANIA NAD ODWADNIAMIEM OSADOW Z OCZYSZCZALNI SCIEKOW POSZLIFIERSKICH Z HUT SZKTA KRYSZTATOWEGO),
Technical Univ. of Warsaw (Poland). Inst. of Environmental Engineering.
For primary bibliographic entry see Field 5E.
W78-05310

RUSSIAN CLOSED-CYCLE CHEMICAL WORKS,
S. Shantyar.
Water and Waste Treatment, Vol. 21, No. 1, p 7, January, 1978.

Descriptors: *Water consumption, *Industrial wastes, *Tertiary treatment, *Chemical wastes, *Water reuse, Recycling, Biological treatment, Activated sludge, Sewage treatment, Waste water treatment, Waste water disposal.

The Pervomaisk chemical complex in the Ukraine has become the first industrial complex in the USSR to operate with a closed-cycle water system. Because mixing of effluent streams resulting from various manufacturing processes may produce complex reactions, the wastes are treated separately in five streams and the on-site reuse of waste water is maximized. The buffer pond, used to treat discharges having a low mineral content, is also used to treat sewage from the chemical complex and the neighboring town. Ion-exchange resins are used to treat the waste water prior to reuse. Materials recovered during the waste water treatment process are also recycled, with polyvinyl chloride particles used in the manufacture of facing tiles. Activated sludge is used for protein-vitamin feed concentrates and ammonia and nitric acid liquors for nitrogenous fertilizers. Adoption of the closed-cycle water system has reduced water consumption at the plant to 3% of its previous level. (Schulz-FIRL)
W78-05311

THE INTEGRATED STEELWORKS OF SOLMER AT FOS-SUR-MER.
For primary bibliographic entry see Field 5G.
W78-05312

MICROBIAL TREATMENT OF AN INDUSTRIAL EFFLUENT CONTAINING VOLATILE FATTY ACIDS,
Orange Free State Univ., Bloemfontein (South Africa). Dept. of Microbiology.
J. C. Du Preez, and P. M. Lategan.
South African Journal of Science, Vol. 73, No. 11, p 349-351, November, 1977. 1 fig, 1 tab, 7 ref.

Descriptors: *Oil industry, *Acid, *Microbial degradation, *Minerals, *Salts, Bacteria, Oil wastes, Fermentation, Analytical techniques, Laboratory tests, Waste water treatment, Proteins, Carbon, Industrial wastes.

Bacterial consumption of fatty acids was tested in laboratory experiments with aqueous effluent produced by an oil-from-coal plant. The effluent consisted of 70% acetic acid, 15% propionic acid, 10% butyric acid, 5% valeric acid, 0.1% emulsified oil, 0.02% alcohols and ketones, and 2-10 ppm iron. Batch fermentation of the effluent with selected organisms was conducted in a mineral salt solution culture medium at 30 and 40C with a constant pH controlled by sulfuric acid additions. A 24-hour incubation period indicated that two strains of Acinetobacter calcoaceticus exhibited the greatest growth rate and cell yield at optimum temperatures of 30-32C at pH 7.0. Measurement of fatty acid components after fermentation showed that A. calcoaceticus strain B1 consumed 99% of the fatty acids, leaving only isobutyric acid. Strain B2 reduced the fatty acids 88%, completely consuming n-butyric and n-valeric acids. The fatty acids in solution were the only source of carbon for the bacteria; the pH was observed to rise as these acids were converted. The use of these bacteria for fatty acids treatment was considered a potential source of single cell protein. (Lisk-FIRL)
W78-05313

SHOCK BACKWASH FILTER CUTS WASH WATER WASTE,
D. Martin.
Process Engineering, p 71, September, 1977.

Descriptors: *Filtration, Pulp and paper industry, *Food processing industry, *Filters, *Deposition, Separation techniques, *Industrial wastes, Waste water treatment, Waste water disposal.

Tubular filters with automatic shock backwash systems for cleaning were discussed. Parallel linking of tubular filter units allowed for the treatment of flow rates up to 3,000 gal/min with suspended solids content up to 500 ppm. The backwash system, with an automatic pressure sensor, shuts the outlet valve, allowing air or gas pressure in the effluent contained in the dome of the tube to build up. When adequate compression is attained, the drain is opened, causing a high velocity flow over the filter to clear the deposit. The system contains reusable filters, is corrosion resistant, and is enclosed to prevent exposure to products to the atmosphere. A 50% increase in flow rate may be attained by parallel linking of dual tube filter systems. The filter system has been used in the pulp and paper industry and may be adapted for use in chemical, food and beverages, and other industries. Filter elements are available in fabric bag, wire mesh, and perforated and slotted stainless steel. corrosion resistant linings for treatment of chemicals are in the process of design. (Lisk-FIRL)
W78-05314

MEMBRANE PROCESS FOR THE TREATMENT OF SULPHITE SPENT LIQUOR. POSSIBILITIES AND LIMITS. (MEMBRANVERFAHREN ZUR BEHANDLUNG VON SULFITABLAUGEN MOEGLICHKEITEN UND GRENZEN),
Technische Hochschule, Darmstadt (West Germany). Inst. fuer Makromolekulare Chemie.
T. Krause, and G. Widjaja.
Das Papier, Vol. 31, No. 11, p 461-467, 1977. 12 fig, 2 tab, 10 ref.

Descriptors: *Membrane processes, *Carbohydrates, *Lignins, *Sulfonates, Pulp and paper industry, *Industrial wastes, Separation techniques, Waste water treatment, Sulfite liquors.

Ultrafiltration of sulfite pulp industry liquor was tested with commercial membranes. Pilot units, based on the hollow fiber principle, were employed to separate solids contained in the sulfite spent liquor from the wash water used in the pulping proce s. The pilot ultrafiltration cell operated in a discontinuous mode. Commercial membranes with varying pore sizes were used in the ultrafiltration of the sulfite spent liquor. Separation characteristics of the membranes for carbonhydrates and lignine sulfonates were observed. Lignine sulfonates were fractionated from the spent liquor produced during acid magnesium bisulfite digestion. Fractionated quantities of carbonhydrates and lignine sulfonates was calculated for lignine sulfonates contained in the concentrates and the filtrates. (Lisk-FIRL)
W78-05315

THE PRODUCTION OF CHEMICALS FROM PULPING WASTE,
Swedish Forest Products Research Lab., Stockholm.
For primary bibliographic entry see Field 5E.
W78-05316

CROWN ZELLERBACH'S WASTE WATER TREATMENT UNIT IN WASHINGTON SAID TO BE AREA'S LARGEST.
Paper Trade Journal, Vol. 162, No. 2, p 24, January, 1978.

Descriptors: Pulp and paper industry, *Pulping wastes, *Biochemical oxygen demand, *Aerated lagoons, *Aeration, Sludge disposal, Waste water treatment, Water quality control, Industrial wastes, Waste water disposal, Washington.

A $7.6-million secondary waste treatment facility is being used to process up to 75 mgd of effluent from the Crown Zellerbach Corp pulp and paper mill in Camas, Washington. Two aeration basins with a combined area of 108 acres contain 53 surface aerators which reduce the BOD level in the waste water. The effluent is first pumped to a primary treatment and sludge disposal plant. The waste water is then pumped into the larger of the two aeration basins where its BOD level is reduced by 88% over a three-day aeration period. The waste water is then transferred to the second basin, covering 42 acres, where it undergoes another two days of aeration and a further BOD reduction of 6%. The treated effluent is then discharged into the Columbia River. The Crown Zellerbach Corp, which produces 360,000 tons of paper each year, at the Camas mill, has spent more than $22 million on waste treatment facilities over the last 11 years. (Lisk-FIRL)
W78-05317

POSSIBILITIES AND MEASURES TAKEN BY THE PULP INDUSTRY FOR THE PROTECTION OF THE ENVIRONMENT (MOEGLICHKEITEN UND MASSNAHMEN DER ZELLSTOFFINDUSTRIE IM INTERESSE DES UMWELTSCHUTZES).
For primary bibliographic entry see Field 5G.
W78-05318

METSA-BOTNIA'S KRAFT MILL COMES ON STREAM,
J. Kalish.
Pulp and Paper International, Vol. 19, No. 12, p 57-61, 84, November, 1977. 2 fig, 1 tab.

Descriptors: *Treatment facilities, Pulp and paper industry, *Pulp wastes, *Water pollution control, Clarification, Aeration, Oxidation lagoons, Recycling, Effluents, Industrial wastes, Equipment, Waste water treatment.

The 250,000 ton/yr bleached kraft operation at Kaskinen on the western coast of Finland is described. The $244 million mill was designed to process both hardwood and softwood pulps in a highly streamlined, single-line operation. A Kamyr digester rated at 885 air dry m tons/day, followed by a conventional six-stage C/DEHDED bleaching line, comprises the main processing line. A separate 140 tpd M and D Bauer Digester is used to process sawdust which is then blended with the main pulp line before screening. Since water supplies from the River Narpio are somewhat limited, the mill was designed for the relatively low water consumption of 140 cm m/ton of pulp. Average water requirements are 200 cu m/ton. Waste water from the plant first passes to a 60 m-diameter clarifier for removal of fiber. The sludge from the clarifier underflow is dewatered and then incinerated in the mill's power boiler. A fine-bubble bottom aeration system, developed in Finland by Nokia, is used to reduce the BOD content. The system includes a 15.6-ha lagoon equipped with nine aeration raft units, each about 40-m long and having its own compressor. The system of fine-bubble diffusers distributes compressed air to a depth of about 4 m at an energy cost of 2.2-2.5 kg 02/kWh. BOD reductions of about 50% are achieved for the 49,000 cu m/d of waste water generated at the plant. (Schulz-FIRL)
W78-05319

PULP AND PAPER RESEARCH AT UQTR--RELIEF FOR AN EMBATTLED INDUSTRY,
For primary bibliographic entry see Field 5E.
W78-05321

IS CHEAP RECOVERY IN SIGHT FOR SULFITE.
For primary bibliographic entry see Field 5E.
W78-05322

PULP INDUSTRY AND PROTECTION OF SURFACE WATERS (ZELLSTOFF-INDUSTRIE UND GEWAESSERSCHUTZ),
For primary bibliographic entry see Field 5G.
W78-05323

THE KATOX-F PROCESS FOR PURIFYING OF NON-BIODEGRADABLE WASTEWATERS,
Krupp Industrie-und Stahlbau, Essen (West Germany). Abt. Umwelttechnik.
C. Oehme.
La Tribune du Cebedau-Becewa, Vol 30, No 407, p 344-350, October, 1977.

Descriptors: *Textiles, Pulp and paper industry, *Chemical industry, *Activated carbon, *Oxidation flocculation, Chemical precipitation, Chemical oxygen demand, Biochemical oxygen demand, Water purification, Waste water treatment, Industrial wastes.

An oxidation and precipitation system has been developed for the treatment of non-biodegradable waste water effluent from various industries. The Katox-F catalytic oxidation process effectively clarifies and decontaminates the high COD- and low BOD-containing wastes from textile, paper, cellulose, leather, chemical, and pharmaceutic industries. A series of three activated carbon wash basins is used to accelerate the oxidation of toxins contained in the industrial effluent. The reduction of COD in the first wash basin is about 50%, with further COD reductions of 40% and 30% in the second and third basins, respectively. The oxidized effluent then undergoes flocculation with a precipitant such as lime of FeSO4 for the removal of phosphates, carbonates, sulphates, albuminous compounds, and organic carbon acids. The COD reduction in this step is appoximately 50%. Removal of all remaining contaminants is achieved by filtration through an ion exchange column which effectively reduces the COD content by 90%. A cost analysis is presented for the use of a Katox precipitation plant for the purification and decolorization of up to 1,200,000 cu m of waste water from a textile mill near Bielefeld, Germany.

The treated effluent can be reused or discharged to public waters. (Lisk-FIRL)
W78-05324

ECOLOGICAL ASPECTS OF WATER USAGE IN THE TEXTILE INDUSTRY,
CIBA-GEIGY Ltd., Basle (Switzerland).
G. Duerig.
Review of Progress in Coloration and Related Topics, Vol 7, p 70-79, 1976. 15 fig, 16 tab, 33 ref.

Descriptors: *Textiles, *Dyes, *Water supply, *Waste water treatment, *Industrial wastes, Heavy metals, Biochemical oxygen demand, Chemical oxygen demand, Cotton, Activated sludge.

Water usage and waste water treatment methods used by the textile industry are discussed. It is estimated that the textile industry uses 50-300 liters of water per every kilogram of finished textiles. A 96% water consumption reduction was realized by the replacement of a continuous washer or a rotary hydroextraction system with a winch washing system for the washing of reactive dye prints. The biodegradation of textile wastes has been accelerated by the reduction of high oxygen demands through the replacement of enzyme degradation with a persulfate oxidizing agent. The high levels of heavy metals which can occur in textile effluents often result in the need for treatment in excess of that occurring during dyeing procedures before the wastes can be discharged into a treatment facility. The activated sludge process has been recommended for the removal of solids and biodegradable material produced by cotton mills. Removal of other wastes such as dyes, chemicals, and nondegradable materials must be achieved by other treatment processes, such as sedimentation, ion exchange, aerobic treatment, or electrolyis.
W78-05325

WOOL DYEING TECHNIQUES WITH LOW CHROMIUM CONCENTRATIONS IN WASTE WATERS (WOLLFARBEVERFAHREN MIT NIEDRIGEM CHROMGEHALT DES ABWASSERS),
International Wool Secretariat, Ilkley (England). Technical Centre.
L. Benisek.
Textilveredlung, Vol. 12, No. 9, p 406-415, September, 1977. 6 fig, 12 tab, 35 ref.

Descriptors: *Chromium, *Dyes, *Textiles, *Chemical reactions, *Effluents, *Reduction(Chemical), Organic acids, Chemical wastes, Water pollution control, Waste water treatment, Industrial water.

A wool dyeing process which yields lower residual hexavalent and trivalent chromium concentrations in dye bath effluents has been developed. The process involves the addition of alpha-hydroxy-monocarboxylic acids, especially lactic acid, to the after-chrome dyeing step. The acids are added at the normal dye to dichromate ratios within an optimum pH range of 3.4-3.6. The hexavalent chromium is reduced to the trivalent state on the wool fiber. Within the optimum pH range, lactic acid addition may not be required for potassium dichromate concentrations below 1% and high dye to dichromate ratios. Sulfates or complexing agents such as ethylenediaminetetraacetic (EDTA) acid may produce an increase in the residual chromium bath concentration. The residual hexavalent chromium concentration may also be reduced by the addition of other dicarboxylic and hydrocarboxylic acids which form stable complexes with trivalent chromium. Lactic acid does not affect shade or color fastness; the flame-resistance of the wool is slightly improved over that produced by conventional dyeing methods. (Schulz-FIRL)
W78-05326

EFFLUENT TREATMENT IN THE TEXTILE INDUSTRY,
Shirley Inst., Manchester (England).
For primary bibliographic entry see Field 5G.
W78-05327

MINI-SYMPOSIUM ON EFFLUENT CONTROL 'UPDATE 1976--GROUP IV',
Waste Water Engineers, Inc., Nashville, TN.
T. H. Patton, Jr., and H. Ellison.
Journal of the American Leather Chemists Association, Vol. 72, No. 11, p 444-449, November, 1977. 2 tab.

Descriptors: *Tannery wastes, *Treatment facilities, *Industrial wastes, *Waste water treatment, *Costs, *Chrome, Sludge treatment, Ammonia, Sulfur compounds, Odor, Water pollution control, Waste water disposal.

A summary of the presentations and discussions which occurred during the Group IV Mini-Symposium on Effluent Control at the Seventy-second annual meeting of th American Leather Chemists Association is presented. Updated pollution control facilities for the Armira Corporation's tannery in Bolivar, Tennessee, and a discussion of various effluent control aspects were the major topics of te symposium. Armira's Bolivar tannery is a complete chrome tannery, designed to process salted cattle hides. Waste from the tannery's treatment system is discharged to the Hatchie River, a slow moving river draining a large agricultural and woodland area. The various points raised and discussed in the symposium included: chrome (the differentiation between hexavalent and trivalent chrome), ultimate fate of tannery sludges, sulfate standards for waste effluent, ammonia nitrogen standards, development of effluent stream standards, municipal discharge user charges, European tannery practices, power cost and availability, irrigation, and odor problems. (Baker-FIRL)
W78-05329

THE USE OF POLY-ELECTROLYTES IN A CLOSED SYSTEM OF TANNERY EFFLUENTS,
Johannesburg Tanning Co., Ltd., Transvaal (South Africa).
N. Berg, and P. Marais.
Journal of the Society of Leather Technologists and Chemists, Vol. 61, No. 6, p 129-131, November-December, 1977. 3 tab.

Descriptors: *Tannery wastes, *Polyelectrolytes, *Sodium compounds, *Clarification, *Flocculation, Suspended solids, Separation techniques, Oxidation, Aeration, Waste water treatment, Industrial wastes.

Clarification of tannery waste water was achieved with polyelectrolytes and ferrous sulfate. The effluent from the lime yard and chrome tanning procedures contained a large quantity of 0A, 900-1,200 ppm, with a pH range of 7.1-11.2. The polyelectrolyte clarification procedure was selected because of the high, precipitable sodium sulphide content of the 0A and the readily oxidized properties of the other organic substances. Ferrous sulfate was chosen for its ability to form an insoluble sulfide precipitate and a ferrous ion precipitate. Settlement of the organic materials occurred during clarification with the ferrous sulfate and polyelectrolyte at a rate of 1-2 m/h. Further clarification was achieved because of the attraction and aggregation of charged and uncharged particles to form large particles in tube settlers. Sludge was removed to a batch vacuum pump filter press for dewatering before the effluent was subjected to a second aeration. This step reduced the 0A from 200-300 ppm to 80-120 ppm, a level within effluent standards for discharge to a municipal treatment facility. (Lisk-FIRL)
W78-05330

TREATMENT PLANT AT REDBOURN.
For primary bibliographic entry see Field 5G.
W78-05331

ON-LINE INDUSTRIAL WATER POLLUTION MONITORS,
For primary bibliographic entry see Field 5A.
W78-05332

SUBMERGED ENCLOSURES MAY HELP SINK PLANT PROBLEMS,
H. F. Instruments, Ltd., Bolton (Ontario).
E. S. Posgate.
Water and Wastes Engineering, Vol. 14, No. 9, p 127-128, 131-133, September, 1977. 5 fig.

Descriptors: Equipment, *Suspended solids, *Separation techniques, *Water treatment, Waste water treatment, Costs, Treatment facilities, Settling basins, Industrial wastes, Municipal wastes.

The use of submersible settling enclosures for the treatment of water and waste water is considered. An enclosure of reinforced polyethylene, submerged and connected to the intake at water plants, should remove most of the suspended solids in raw water and reduce the cost of plant control. The device does not require power and it can occupy land which has no other value. Estimated life, with periodic servicing, is expected to extend beyond 20 and closer to 50 years. Large industrial reservoirs used for quiescent settling of suspended solids are subject to weather disturbances. It is not always practical to cover large reservoirs with plastic sheeting. A submerged settler installed close to the effluent discharge in such reservoirs could be used to provide continuous discharge under all conditions to receiving waters. The suspended solids and turbidity loads of raw water entering treatment plants would be largely reduced. By using a submerged settler connected to the effluent discharge, the spill could be contained. The settler could also be aerated to reduce the BOD load on the receiving water. (Baker-FIRL)
W78-05333

TREATING THE EFFLUENT,
G. Solt.
Engineering, p 831-833, October, 1977.

Descriptors: *Industrial wastes, *Waste water treatment, *Costs, *Chemical wastes, *Equipment, Waste water disposal, Metals, Separation techniques.

Recent advances in the field of industrial waste water treatment are reviewed. The first advancement came in the form of wider recognition that effluent treatment processes cannot be viewed in the same manner as manufacturing processes used in an industry's normal activity. The effluent process is alien to the industry it serves. The staff who operate the treatment plant often tend to lack any wider expertise in the field. Economic factors which must be considered in the selection of a treatment process are reviewed. In some cases, such as those in which the effluent contains cyanide, the degree of freedom in such a selection is very small. At other times, the choice between various kinds of treatment is dependent upon the desired effluent quality and the corresponding cost. Specific problems in the metal finishing, steel, pulp and paper, and oil refining industries are discussed. (Baker-FIRL)
W78-05334

THE USE OF MEMBRANE FILTERS TO PRODUCE BACTERIA-FREE WATER TO BE USED IN A SPF-LABORATORY, (IN GERMAN),
Schering A. G., Berlin (West Germany). Dept. fuer Tierzucht Haltung.
For primary bibliographic entry see Field 5F.
W78-05335

CHARACTERISTICS AND TREATMENT OF BREWERY WASTES,
S. Beszedits.
Water and Pollution Control, Vol. 115, No. 10, p 10-13, October, 1977. 1 fig, 2 tab.

Descriptors: Food processing industry, *Biochemical oxygen demand, *Suspended solids, *Activated sludge, *Trickling filters, Treatment facilities, Biological treatment, Industrial wastes, Waste water treatment, *Brewery wastes.

Various processing stages in beer production include mashing, fermentation, storage or lagering, and bottling. Waste water is produced during the brewing process at a rate of 15 barrels of water to one barrel of finished product. Effluents from breweries are generally high in BOD and suspended solids and low in nutrients, hence nitrogen and phosphorus must usually be added for biological treatment. Characteristics of several effluent streams from the brewery process are summarized. Various breweries have adopted process changes to reduce the effluent volume as well as the pollutant load in terms of BOD and suspended solids. The Adolph Coors Company brewery in Golden, Colorado, has modified operations to reduce the total waste volume by 58%, the BOD by 75%, and the suspended solids by 79%, relative to average figures for brewery waste water. Results of a sampling program to provide data on variations in effluent characteristics with them are presented. Although most breweries in North America discharge their effluents to municipal sewers, neutralization and some degree of pretreatment is usually required. The activated sludge process has been used at the Coors plant and at other breweries. Contact stabilization, oxygen aeration, trickling filters, rotating biological filters, and anaerobic filters have also been employed. Recent studies have examined the recovery of spent grain, spent hop, trub, and excess yeast for use as animal feed supplements. (Schulz-FIRL)
W78-05336

COKE PLANT EFFLUENTS NITRIFICATION STUDY,
J. Komow.
Water and Pollution Control, Vol. 116, No. 1, p 14, 16, January, 1978.

Descriptors: *Nitrification, *Biological treatment, *Biochemical oxygen demand, *Ammonia, *Hydraulic structures, Pilot plants, Laboratory tests, Chlorination, Nitrates, Treatment facilities, Waste water treatment, Industrial wastes.

The application of the biological nitrification process to coke plant effluents was evaluated in laboratory and pilot plant studies. Analytical observations of the coke plant effluent indicated that nitrification had to be suppressed to obtain accurate BOD data for carbonaceous elements in the waste. Four biological treatment tests with single and two stage models were conducted with controlled pH and additions of glucose and phosphorus. In both models, hydraulic retention times of 1.8 days were found more effective than shorter retention times. A 97% nitrification rate was accomplished in the experiments, with total elimination of cyanide and a reduction of freon-extractable materials levels to effluent standards. The addition of a polyelectrolyte to the clarification stage was considered as a means of reducing residual BOD levels and suspended solids. Pilot plant operations demonstrated that ammonia liquor concentrations of 250 mg/liter of nitrogen could be reduced to 10 mg/liter. Denitrification tests in the pilot plant were unsuccessful because of mechanical problems. The substitution of pure oxygen for air in the aeration process was examined as a means of economically maintaining a dissolved oxygen content of 6-8 mg/liter in the reactor. (Lisk-FIRL)
W78-05337

THE SUCCESS OF REINFORCED PLASTICS FOR PROCESS PLANT IN CORROSIVE ENVIRONMENTS,
For primary bibliographic entry see Field 8G.
W78-05338

ADSORPTION STUDIES USING GAS-LIQUID CHROMATOGRAPHY--II. COMPETITIVE ADSORPTION,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W78-05339

INDUSTRIAL FILTRATION, FUNDAMENTALS OF MEDIA SELECTION, FILTER DESIGN AND INSTALLATION.
Engineering Materials and Design, Vol. 21, No. 12, p 25-30, December, 1977. 12 fig.

Descriptors: *Filtration, *Porous media, *Membranes, *Absorption, *Filters, Oil wastes, Air pollution, *Industrial wastes, Separation techniques, Waste water treatment.

Effective filtration media and designs are examined with regard to the properties of various contaminants. Geometrical or surface media, and statistical or depth media, are the types of pore structures analyzed for filtration capabilities. Quantitative retention of solid particles requires use of a statistical medium in conjunction with a geometrical medium. Geometrical media are recommended for plastics and fibers which can pass through depth media. Synthetic membranes are more effective for the retention of microorganisms which are able to grow through small pores. Statistical media are recommended for process residues. Surface filters, constructed of woven metal, paper or cloth; edge filters, containing washers between metal or paper discs; and chemically active or inactive absorption filters are often used, especially in conjunction with wire mesh strainers, in lubrication, hydraulic, and fuel oil systems. Centrifugal filters and magnetic filters, which attract iron particles from the oil, are also employed in liquid filtration systems. Dry filters constructed of pleated paper or material, and oil bath filters have been found effective for air filtration in compressed air systems. (Lisk-FIRL)
W78-05340

DIRECT TREATMENT OF ORGANIC WASTEWATER BY TRICKLING FILTER (SANSUIROSHO NI YORU KONODO HAISUI NO CHOKUSETSU SHORI NI KANSURU KENKYU),
National Research Inst. for Pollution and Resources, Tokyo (Japan), and Agency of Industrial Science and Technology, Tokyo (Japan).
T. Ishihara, M. Tanaka, T. Tashiro, M. Hirai, and Y. Urushikawa.
Showa 51 Nendo Kankyo Hozen Kenkyu Seika Shu (I), (A Collection of Results on the 1976 Environmental Conservation Researches), Vol. 1, No. 43, p 1-8, 1976. 6 fig, 5 tab, 5 ref.

Descriptors: *Trickling filters, *Biomass, *Carbon, *Chromatography, *Biochemical oxygen demand, Organic substances, Waste water treatment, Municipal wastes, Waste water disposal, Treatment facilities.

Research on the kinetics of total organic removal by trickling filters and on the residual components on filtered effluents is described. Substrate removal kinetics of total organic carbon with concentrations up to 3,000 mg/liter of waste water were calculated using the Michaelis-Menten formula. Gel chromatograms were obtained for soluble starch and peptone-glucose synthetic wastes and for wheat starch production wastes. Common peaks at 220 and 254 nm were noted in all of the chromatograms. A mean molecular weight of 2,100 was calculated according to saccharide standard for the common peaks. Increased treatment time was found to correlate with the peak height, suggesting aromatization of new metabolites during treatment. Corn steep liquor with a high BOD was treated semicontinuously over a two-month period and analyzed for its biomass production. A mean biomass production ratio of 0.29 g dry matter/g BOD loaded was obtained along with a 60% mineralization rate for total organic carbon. (Lisk-FIRL)
W78-05341

TREATMENT OF WASTE WATER FOR EUTROPHICATION CONTROL (SANGYO HAISUI NO FUEIYOKASEIBUN NO SHORI NI KANSURU KENKYU),
Fermentation Research Inst., Tokyo (Japan) Div. of Microbe Engineering.
M. Dazai, E. Mikami, T. Hashinaga, N. Futai, and K. Nakamura.
Tsusansho Kogyogijutsuin Sangyokogai Kenkyuchoseikyoku 51 Nendo Kogaitokubetsu Kenkyu Hokoku, (Report of the 1976 Pollution Special Research, Industrial Pollution Research Coordination Bureau, Agency of Industrial Science and Technology), No 47, p 1-2, July, 1977.

Descriptors: *Eutrophication, *Biochemical oxygen demand, *Activated sludge, *Biological treatment, *Organophosphorous compounds, Denitrification, Nitrogen fixing bacteria, Methane bacteria, Waste water treatment, Industrial wastes.

The treatment of industrial waste waters to prevent eutrophication was attempted by biological methods to remove BOD, total organic carbon, organophosphates, and by nitrification. A total organic carbon removal rate of 93% was achieved for a daily carbon load of 4 kg/cu m of corn steep liquor with activated sludge treatment and millipore filtration. Anerobic digestion of high BOD effluent containing 44,000 ppm volatile solids resulted in acid fermentation at a volatile solids loadings of 26.4, 17.6, and 8.8 kg/cu m/day after 4, 8, and 25 days, respectively. Methane fermentation stabilized after 30 days at a loading rate of 4.4 kg/cu m/day. Higher volatile acid and hydrogen concentrations and lower BOD removal were observed during acid fermentation. A further test showed that gram positive bacterica S-1 in innoculated sludge consumed 100% of a 1,500 ppm load of dioctyl phthalate after three days. Organophosphate removal with activated sludge and aeration was incomplete. A 10% organic phosphate removal was achieved after 48 hrs aeration and 30% removal after 7 days. Nitrifying bacteria in three activated sludge systems were compared and evaluated for denitrification characteristics. The use of methane in the denitrification process was evaluated. (Lisk-FIRL)
W78-05342

CHOOSING AN APPROPRIATE WATER TREATMENT,
Agency for International Development, Manilla (Phillipines).
For primary bibliographic entry see Field 5G.
W78-05343

WORKSHOP PROCEEDINGS: RESEARCH NEEDS RELATED TO ACID MINE WATER.
West Virginia Univ., Morgantown. Water Research Inst.
For primary bibliographic entry see Field 5G.
W78-05345

COMMUNITY RESPONSE STRATEGIES FOR ENVIRONMENTAL PROBLEMS OF WATER SUPPLY AND WASTEWATER DISPOSAL IN FAIRBANKS, ALASKA,
Alaska University, College. Inst. of Water Resources.
For primary bibliographic entry see Field 5G.
W78-05357

ALTERNATIVES TO THE MANAGEMENT OF HAZARDOUS WASTES AT NATIONAL DISPOSAL SITES. VOLUME II. APPENDICES.
Little (Arthur D.) Inc., Cambridge, MA.
For primary bibliographic entry see Field 5G.
W78-05418

FOAM BREAKING -- KEY PROCESS IN DETOXIFICATION OF KRAFT MILL EFFLUENTS BY FOAM SEPARATION,
B. C. Research Ltd., Vancouver.
K. S. Ng, J. C. Mueller, and C. C. Walden.
The Canadian Journal of Chemical Engineering, Vol. 55, No. 4, p 439-444, August, 1977. 7 fig, 16 ref, 4 tab.

Descriptors: *Pulp wastes, *Bleaching wastes, Toxicity, *Foam separation, *Waste water treatment, Wastes, Industrial wastes, Waste treatment, Water pollution sources, Water pollution treatment, Pulp and paper industry, Effluents, Turbines, Capital costs, Costs, Separation techniques, Water purification, Water quality control, Kraft mills.

Bleached kraft mill effluents were treated in a 0.38 cu m/min foam separation pilot plant to study the performance of a turbine foam-breaking system and to develop the design parameters for large-scale application. A 3-blade vaned-disk turbine was chosen for foam breaking. Major process variables controlling foam breaking were system design, tip velocity, rotation speed, and foam load. A foam breaking system with only restricted liquid draw-off performed 3-16 times better than a conventional flow-through system. A 38-cm diameter turbine operating at 1800 rpm (3600 cm/sec tip velocity) collapsed up to 1.2 cu m/min of foam. Design equations developed for sizing of foam breakers suggest that a 61-cm diameter 21-kw turbine will collapse 4.7 cu m/min of foam. For a 95,000 cu m/day foam separation plant, approximately 12 foam breakers are required at an estimated capital cost of $108,000. (Swichtenberg-IPC)
W78-05444

CLEVEPAK'S SUBMERGED AERATION SYSTEM CUTS ENERGY USE AT EATON CHIPBOARD MILL,
K. R. Boiko.
Paper Trade Journal, Vol. 161, No. 23, p 24-26, December 1, 1977. 4 illus, 2 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Aeration, *Energy, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Aerated lagoons, Indiana, Pulp and paper industry, Effluents, Mixing, Pumps, Biochemical oxygen demand, Treatment facilities, Board mills.

The Aerocleve aeration system has been installed in the aeration lagoon (175-ft wide by 250-ft long, 8.5 ft water depth) at Clevepak Corp.'s 130 ton/day chipboard mill in Eaton, Indiana. The system consists of 2 Roots positive-displacement pumps and 4 Flygt submersible pumps which are located at 2 pump well stations near the bottom of the aeration basin. Vortex mixing chambers disperse low-pressure air into small bubbles which are distributed into he bottom region of the basin as a high-energy turbulent plume. Conservation of the thermal energy of the mixed liquor and adequate mixing are obtained with the Aerocleve system in contrast to conventional surface aerators. Effluent BOD averages 15 mg/liter, i.e., a 99% reduction over influent BOD, at the Eaton mill. (Swichtenberg-IPC)
W78-05446

NEW TYPE OF EFFLUENT TREATMENT IN CORRUGATED BOARD MANUFACTURE (NEUARTIGE ABWASSER-AUFBEREITUNG BEI DER WELLPAPPEN-FABRIKATION).
Allgemeine Papier-Rundschau, No. 44, p 1380, November 5, 1977. 1 tab.

Descriptors: *Waste water treatment, *Pulp wastes, Pulp and paper industry, Water pollution sources, Water pollution treatment, Wastes, Industrial wastes, Waste treatment, Adhesives, Oil, Flocculation, Flotation, Sludge, Hydrogen ion concentration, Dewatering, Chemical oxygen demand, Biochemical oxygen demand, Sludge treatment, *Paper converting industry, *Clarifiers, Printing inks, Corrugated board.

The ink, glue, and oil effluents obtained during the manufacture of corrugated board are reviewed, and the Serpaflo clarifier for treating such effluents is described. The clarifier includes a chamber for adding flocculating agents, a flotation chamber with sludge removal means, an overpressure station, a container for clarifier water, pH measuring and control means, sludge-dewatering box, and control panel. Test data involving ink and ink plus glue solutions show the clarifier to be capable to reducing solids by 98-98.5%, COD by 83-89%, and BOD by 43-82%. (Speckhard-IPC)
W78-05448

PURIFICATION OF EFFLUENTS AT THE SYAVA SILVICHEMICAL FACTORY (OCHISTKA STOCHNYKH VOD NA SYAVSKOM LESOKHIMICHESKOM ZAVODE),
Syavskii Lesokhimicheskii Zavod (USSR).
N. K. Molodtsov, M. F. Morozov, P. S. Fokin, and G. S. Kudryavtsev.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 5, p 5-6, 1977. 4 tab.

Descriptors: *Waste water treatment, *Chemical industry, *Wood wastes, Wastes, Industrial wastes, Waste treatment, Effluents, Water pollution sources, Foreign countries, Biological treatment, Neutralization, Municipal sewage, Sedimentation, Evaporation, Color, Biochemical oxygen demand, Phenols, Suspended solids, Water pollution treatment, Water pollution control, *Silvichemicals, Soviet Union(USSR), Tar.

At the Syava (USSR) wood-chemical plant, equipment for mechanical purification and neutralization of effluents began operating in 1969, and equipment for biological purification (jointly with municipal sewage) in 1973. Prior to the construction of this facility, the effluents that were discharged into the local river caused excessive pollution and fishkill. Presently the effluents are treated first at the plant, by a combination of sedimentation, evaporation, and neutralization, This reduces the color, BOD, and the contents of volatile phenols and tar. Subsequent mechanical and biochemical purification in equipment outside the plant further reduces the contents of pollutants. The river water near the discharge point meets sanitary standards (BOD not more than 6 mg/liter, phenols not more than 0.001 mg/liter, and suspended solids not more than 0.75 mg/liter). (Stapinski-IPC)
W78-05449

DETERMINATION OF RESINOUS SUBSTANCES IN EFFLUENTS FROM THE PRODUCTION OF WOOD ROSIN (OPREDELENIE SMOLISTYKH VESHCHESTV V STOKAKH KANIFOL'NO-EKSTRAKTSIONNOGO PROIZVODSTVA),
Tsentralnyi Nauchno-Issledovatelskii i Proektnyi Inst. Lesokhimicheskoi Promyshlennosti, Khimki (USSR).
For primary bibliographic entry see Field 5A.
W78-05450

PURIFICATION OF RESIDUAL LIQUOR FROM YEAST CULTIVATION WITH MOLD FUNGI (OCHISTKA POSLEDROZHZHEVOI BRAZHKI PLESNEVYMI GRIBAMI),
Vsesoyuznyi Nauchno-Issledovatelskii Inst. Gidroliznoi Promyshlennosti, Moscow (USSR).
T. V. Zharova, A. G. Zyryanova, and N. I. Novoselova.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 5, p 4, 1977. 2 tab.

Descriptors: *Effluents, *Yeasts, *Waste water treatment, *Fungi, *Biological treatment, Wastes, Industrial wastes, Waste treatment, Cultures, Organic compounds, Biochemical oxygen demand, Water pollution treatment, Water pollution sources, Microorganisms, Molds, Biomass.

A process is described for the biological purification of residual liquor from yeast production. Following separation of the yeast cells, the residual liquor is pumped into the yeast-growing tanks where it is subjected to biological oxidation by the fungus Spicaria. The cultivation of the fungus to obtain the inocula for the oxidation tanks is similar to the cultivation of yeast inocula. The residual liquor flows through the oxidation tanks at a rate of 10 cu m/hr, and deposite the shore residence time (about 2 hr), the organic substances content is reduced 60-68%. The reduction of the 5-day BOD is up to 79%. The fungus suspension removed from the tanks yields an additional amount of biomass (about 1.5 tons/day). (Stapinski-IPC)
W78-05451

PURIFICATION AND UTILIZATION OF EFFLUENTS AND GASEOUS EMISSIONS FROM THE PRODUCTION OF MODIFIED CLARIFIED WOOD ROSIN (OCHISTKA I UTILIZATSIYA STOCHNYKH VOD I GAZOVYKH VYBROSOV PRI PROIZVODSTVE EKSTRAKTSIONNOI MODIFITSIROVANNOI OSVETLENNOI KANIFOLI),
Tsentralnyi Nauchno-Issledovatelskii i Proektnyi Inst. Lesokhimicheskoi Promyshlennosti, Khimki (USSR).
A. I. Firsov, G. A. Ishcherikova, Z. K. Kuptsova, M. N. Kosonogova, and G. M. Gaiduchenya.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 5, p 7-8, 1977. 5 ref, 2 tab.

Descriptors: *Effluents, *Waste water treatment, *Biological treatment, *Air pollution, Wastes, Industrial wastes, Waste treatment, Water pollution sources, Water pollution treatment, Chemical oxygen demand, Biochemical oxygen demand, Municipal wastes, Waste dilution, Organic compounds, Burning, Hydrogen sulfide, Adsorption, Chemical industry, Wood wastes, Sewage treatment, *Rosin, Maleic anhydride, Terpenes, Wood extractives.

Effluents from the batch production of modified and clarified wood rosin have a COD exceeding 20,000 and a 5-day BOD of up to 11,500 mg oxygen per liter, and contain 24,500 mg/liter of maleic anhydride. The corresponding figures for effluents from the continuous process are 4,700, 2,400, and 1,530 mg/liter, respectively. Studies to determine the possibility of biological oxidation of these effluents diluted with municipal sewage showed that the COD could be reduced by up to 80% and the BOD by up to 98%. The best results were obtained by diluting the effluents to a COD of 1000 mg oxygen per liter. Analysis of condensates of gaseous emissions showed them to contain about 20% volatile organic substances. Among these were terpene hydrocarbons, especially dipentene. The gaseous emissions containing terpenes, hydrogen sulfide, and maleic anhydride can be purified by adsorption or by burning in special furnaces with purification of flue gases. (Stapinski-IPC)
W78-05452

REDUCTION OF POLLUTION AND VOLUME OF EFFLUENTS FROM THE PRODUCTION OF WOOD CHEMICALS AT THE SOLOMBAL' KRAFT MILL (SNIZHENIE ZAGRYAZNENNOSTI I OB'EMA STOCHNYKH VOD LESOKHIMICHESKIKH PROIZVODSTV SOLOMBAL'SKOGO KOMBINATA),
Tsentralnyi Nauchno-Issledovatelskii i Proektnyi Inst. Lesokhimicheskoi Promyshlennosti, Khimki (USSR).
B. M. Malisov, and N. V. Galyanova.

Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 5, p 8-9, 1977. 2 tab.

Descriptors: *Effluents, *Waste water treatment, *Pulp wastes, Wastes, Industrial wastes, Waste treatment, Effluents, Pulp and paper industry, Lignins, Water pollution sources, Water pollution treatment, Chemical oxygen demand, Sedimentation, Biological treatment, Burning, Sludge, Water pollution control, Chemical industry, *Tall oil, Black liquor, Kraft mills, Sulfate soap.

To determine the degree of pollution caused by effluents from the production of tall oil at the Solombal' mill (USSR), analyses were made of effluents from the continuous process of sulfate soap decomposition and from crude tall oil rectification. The volume of the first effluent is about 112.8 cu m/day (2.17 cu m/ton crude tall oil); in contains tall oil, lignin products, fibers, and gypsum. This effluent is not purified presently. Effluents from rectification of crude tall oil have an average COD of 822 kg/day. These effluents are subjected to sedimentation and then to biological purification. Recommendations are made for reducing both volume and pollution load by burning of lignin products jointly with black liquor and by utilization of the liquid effluent after separation of the sludge for sulfate soap washing or for the preparation of sulfuric acid. This would reduce the volume of the effluent from sulfate soap decomposition by 98% and its pollution load by 99.8%. The most polluted effluent from tall oil rectification (the fraction from tall oil drying which has a high content of volatile phenols) should be burned jointly with mazout. (Stapinski-IPC)
W78-05453

PROPERTIES OF LIGNOSULFONATES FROM SPENT LIQUORS, WASH WATERS, AND BLEACHING EFFLUENTS FROM SULFITE PULP MANUFACTURE (EINIGE EIGENSCHAFTEN VON LIGNISULFONATEN AUS ABLAUGEN, WASCHWAESSERN UND BLEICHEREIAWAESSERN DER SULFITZELLSTOFFHERSTELLUNG),
Technische Hochschule, Darmstadt (West Germany). Inst. fuer Makromolekulare Chemie.
For primary bibliographic entry see Field 5A.
W78-05454

HYDROLYSIS LIGNIN AS A COAGULANT (GIDROLIZNYI LIGNIN KAK KOAGULYANT),
Arkhangelskii Lesotekhnicheskii Inst. (USSR).
S. B. Pal'mova, and E. D. Gel'fand.
Izvestiya V.U.Z., Lesnoi Zhurnal, Vol. 20, No. 1, p 161-162, 1977. 1 fig, 1 tab.

Descriptors: *Pulp waste, *Waste water treatment, *Lignins, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Biochemical oxygen demand, Chemical oxygen demand, Hydrogen ion concentration, Coagulation, Pulp and paper industry, Effluents, Color, Turbidity, *Black liquor, Kraft lignin, Semichemical pulp, Aluminum oxide.

A study of the effect of adding hydrolysis lignin (0.4-2.25 g/liter) to black liquor (2-2.5 g/liter 5-day BOD, 9-11 g/liter COD, 7.2-9.0 pH) which was chemically purified by acidification to pH 3.5 with sulfuric acid indicated that the hydrolysis lignin acted as a coagulant on the residual effluent, and reduced the amount of turbidity, opalescence, color, and dissolved organic materials. A comparison with alumina, using 1 g/liter of coagulant, indicated that the volume of the precipitate was 25% less when hydrolysis lignin was used. The use of semichemical pulp instead of hydrolysis lignin gave negative results, while kraft lignin proved to be considerably less effective. (Chern-IPC)
W78-05455

REMOVAL OF ROSINOUS MATERIALS FROM PAPER MILL EFFLUENT USING A HIGHLY ACIDIC CATION-EXCHANGE RESIN (MOZNOSTI ODSTRANENI PRYSKYRIC Z PAPIRENSKYCH VOD POMOCI SILNE KYSELEHO KATEXU),
Severoceske Papirni, Steti (Czechoslovakia).
M. Plsek.
Papir a Celuloza, Vol. 32, No. 6, p 171-172, 176, 1977. 2 fig, 4 ref, 3 tab.

Descriptors: *Pulp wastes, *Ion exchange, *Waste water treatment, Separation techniques, Wastes, Industrial wastes, Water pollution sources, Water pollution treatment, Water reuse, Sands, Wood wastes, Activated carbon, Waste treatment, *White water(Paper machine), *Rosin, Abietic acid, Brass.

To facilitate the recycling of paper-machine effluent on the same machine, e.g., for felt washing, the rosin entering the system with size of wet-strength agent has to be removed. These rosinous materials usually contain isomers of abietic acid. Tests were carried out in the laboratory on the removal of the rosin by means of sand, brass shavings, wood shavings, activated carbon, and basic, acidic, and highly acidic Amberlite ion-exchange resins. The best result, i.e., 96% removal of the rosinous materials from paper-machine white water, was obtained with the highly acidic Amberlite IR-120 ion-exchange resin. The effects of column height and service life of the resin on the removal efficiency are also illustrated. (Trubacek-IPC)
W78-05458

PURIFICATION OF BLEACH PLANT EFFLUENT BY ADSORPTION ON CROSSLINKED POLYMERS,
Chalmers Univ. of Technology, Gothenburg (Sweden). Dept. of Chemical Engineering.
O. Samuelson, and B. Wennergren.
Svensk Papperstidning, Vol. 80, No. 15, p 477-479, October 25, 1977. 3 fig, 3 ref, 1 tab.

Descriptors: *Bleaching wastes, *Ion exchange, *Waste water treatment, *Color, Wastes, Industrial wastes, Pulp wastes, Waste treatment, Water pollution sources, Water pollution treatment, Pulp and paper industry, Effluents, Adsorption, Polymers, Anion exchange, Separation techniques, Water purification, Resins, Softwood, Wood extractives.

Effective color removal by adsorption on crosslinked polymers, including anion-exchange resins, requires and acidification of the effluent from the alkaline extraction stage. With the liquors studied (from sulfite pulping and bleaching of sprucewood), wood extractives were precipitated up on acidification. To avoid this complication, the alkaline liquor was passed through a column packed with a nonpolar resin before acidification. Among the resins studied for color removal, a better efficiency was obtained with a weakly basic anion-exchanger in bisulfite (hydrogen sulfite) form (Duolite A-4F) than with macroporous styrene-divinylbenzene polymers (Amberlite XAD-2 or XAD-4), acrylic acid esters (Amberlite XAD-7 and XAD-8), or crosslinked polyvinylprrolidone. (Brown-IPC)
W78-05461

PRACTICAL EXAMPLES OF SPECIAL POSSIBILITIES FOR REDUCING EFFLUENT LOADS IN PAPER MILLS (PRAKTISCHE BEISPIELE FUER SPEZIELLE MOEGLICHKEITEN ZUR ABWASSERENTLASTUNG IN PAPIERFABRIKEN).
Erbsloeh and Co., Geisenheim (West Germany).
C. H. Moebius.
Wochenblatt fuer Papierfabrikation, Vol. 105, No. 18, p 733-734, 736-740, September 30, 1977. 2 fig, illus, 26 ref, 2 tab.

Descriptors: *Pulp wastes, *Water pollution control, *Montmorillonite, Water pollution sources, Pulp and paper industry, Dyes, Colloids, Waste water treatment, Lignins, Effluents, Water pollution treatment, Inorganic compounds, Clays, Retention aids, Titanium dioxide, Starch, Sodium silicate(Water glass), Waste paper.

The use of montmorillonite products for certain special effluent problems in paper mills is discussed. Four examples are considered for preventing too much material from entering the effluent stream. These deal with the use of altonite (formerly called sionite) as a retention aid for titanium dioxide and for dyestuffs, both acid and basic, and for handling problems with protective colloids such as starch and with sodium silicate. For purifying the mill effluents, the use of Flygtol A (another montmorillonite product) is suggested. Examples given are the treatment of effluent from hot water defibering of waste paper, the removal of lignin residues (a process still in the development stage), handling of dyestuffs and titanium dioxide, and the treatment of paper coating-plant effluents. (Ward-IPC)
W78-05462

NEW DEVELOPMENTS IN THE USE OF PEROXY COMPOUNDS. II. SULFITE PULP BLEACHING AND ITS EFFLUENTS (NEUE ENTWICKLUNGEN BEIM EINSATZ VON PERSAUERSTOFF-VERBINDUNGEN--TEIL II: SULFITZELLSTOFFBLEICHE UND DEREN ABWAESSER),
Deutsche Gold- und Silber-Scheideanstalt A.G., Franfurt-am-Main (West Germany).
H. Kruger, and H. Schwab.
Wochenblatt fuer Papierfabrikation, Vol 105, No 18, p 722-727, September 30, 1977. 5 fig, 9 ref, 5 tab.

Descriptors: *Bleaching wastes, *Water pollution, Wastes, Industrial wastes, Water pollution sources, Pulp and paper industry, Effluents, Pulp wastes, Biochemical oxygen demand, Chemical oxygen demand, Oxygen demand, Activated sludge, Thermomechanical pulp, Beech trees(Fagus), Sulfite pulp.

In the Degussa-Ehingen bleaching method, the use of elemental chlorine is avoided, and the waste waters are passed in concentrated form to the spent pulping liquor evaporators. Several Degussa-Ehingen bleaching sequences, especially the P/D/H sequence (peroxide/chlorine dioxide/hyochlorite), are compared with the conventional C/E/H/D/H sequence in the bleaching of beech sulfite dissolving-grade pulp, especially with regard to BOD and COD of the bleaching effluents. There is mention, but not much discussion, of a rapid bleaching method for thermomechanical pulp. A study of the action of the different bleaching effluents on the oxygen consumption (breathing activity) of activated sludge indicated some advantage for the Degussa-Ehingen process. (Ward-IPC)
W78-05463

NEKOOSA (PAPERS INC.) CLEANS CONDENSATES WITH STEAM DISTILLATION.
Chemetics International Ltd., Vancouver (British Columbia).
T. L. Burgess, and D. Voight.
In: Canadian Pulp and Paper Association, Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), p 19-23. 1 fig, 3 tab.

Descriptors: *Pulp wastes, *Steam, *Distillation, *Water pollution treatment, Industrial wastes, Wastes, Industrial water, Water pollution sources, Waste treatment, Waste water treatment, Wisconsin, Pulp and paper industry, Effluents, Evaporators, Heat exchanges, Pollutants, Incineration, Water reuse, Water pollution control, Air pollution, Sulfur compounds, *Kraft mills, Condensates, Black liquor, Turpentine, Methanol.

Foul condensates are collected from digester blow gases, turpentine recovery operation, and black liquor evaporators at Nekoosa Papers Inc.'s kraft mill at Nekoosa, Wisconsin. The condensates are pumped to a feed tank and then through heat exchangers to a distillation column. The distillation column is integrated between the first and second effects of the old multiple-effect evaporators. Stripping steam comes from the first effect and removes total reduced sulfur, turpentine, and methanol from the foul condensates. These pollutants, as well as the noncondensible gases from the digester blows, turpentine recovery, and black liquor evaporators, are destroyed in a special fume incinerator. The stripped condensate is used to heat the incoming feed and then as wash water in the brown stock area. (Swichtenberg-IPC)
W78-05465

STATE OF THE ART REVIEW: AERATION SYSTEMS,
Beak Consultants Ltd., Montreal (Quebec).
K. Farrell, and S. Schneiderman.
In: Canadian Pulp and Paper Association, Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), p 39-44. 2 tab.

Descriptors: *Aeration, *Waste water treatment, *Biological treatment, *Reviews, Wastes, Waste treatment, Ice, Operation and maintenance, Mixing, Oxygenation, Costs, Equipment, Water pollution treatment, Water pollution control, Aerated lagoons.

Factors to be considered in selecting an aeration system for the biological treatment of effluents (viz., high- and low-speed surface aerators and submerged static air-gun aerators) include icing problems during cold weather, maintenance requirements, mixing criteria, standard oxygen transfer rates, and costs. Surface aeration continues to be an attractive method of aeration for shallow and medium-depth lagoons (less than 20-ft deep). Submerged aerators, particularly static air-gun tubes, can be competitive in medium-depth applications and are superior in deep basin lagoons (more than 25-ft deep) by virture of the fact that their oxygen transfer rate is enhanced and their mixing is not deteriorated by greater submergence. Surface aerators cannot adequately mix deep basins, even when equipped with draft tubes. (Swichtenberg-IPC)
W78-05466

EFFLUENT RECYCLE PRACTICES IN GROUNDWOOD/NEWSPRINT OPERATIONS,
Envirocon Ltd., Vancouver (British Columbia).
For primary bibliographic entry see Field 3E.
W78-05468

REDUCTION OF SOLIDS AND FIVE-DAY BOD LOSSES THROUGH PROCESS MODIFICATION AND PHYSICO-CHEMICAL PRIMARY TREATMENT AT FRASER PAPER LTD,
Fraser Companies Ltd., Edmundston (New Brunswick).
D. L. Bishop, and D. J. Cannan.
In: Canadian Pulp and Paper Association Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), p 73-79. 3 fig, 1 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Water conservation, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Pulp and paper industry, Effluents, Suspended solids, Biochemical oxygen demand, Maine, Water pollution control, Water reuse, Recycling, Treatment facilities, Water purification, Sulfite liquors, White water(Paper machines), Starch, Aluminum sulfate, Sodium aluminate.

Solids and BOD losses in the effluent at Fraser Paper Ltd. in Madawaska were reduced to meet Maine's new environmental requirements. Water conservation measures (viz., a common white water collection system, recycling of vacuum pump seal waters, elimination of fresh water from headbox, deckle, and other showers, etc.) reduced the effluent flow to the primary clarifiers from 29 to 26 million gal/day (mgpd) and the solids loading from 89,400 to 48,000 lb/day by January 1976. Further process modifications are expected to reduce total effluent flow to 18 mgpd. Groundwater filtrate, unbleached sulfite water, and starch losses from the repulping of size-press and dry-end broke were identified as the major contributors to BOD. The primary clarification system is described in detail. The effluent is pretreated with 10 ppm alum and 15-20 ppm Na aluminate to improve settleability in the clarifiers. From January to July 1977, the reduction in solids in the clarified effluent averaged 91.5%. (Swichtenberg-IPC)
W78-05469

ENVIRONMENTAL DESIGN PARAMETERS FOR A MODERN SULFITE MILL,
Fraser Companies Ltd., Edmundston (New Brunswick).
P. W. Schriver.
In: Canadian Pulp and Paper Association, Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), p 81-85. 1 fig, 3 ref, 4 tab.

Descriptors: *Water pollution control, *Water conservation, *Pulp and paper industry, Water pollution sources, Wastes, Industrial wastes, Biochemical oxygen demand, Effluents, Evaporators, Bleaching wastes, Sulfite liquors, Cooling water, *Sulfite pulp mills, Closed system, Condensates, Spent pulping liquors, Sulfur dioxide, Acetic acid.

Environmental considerations are outlined from the conversion of Fraser Co. Ltd's ammonia-base sulfite pulp mill in Edmundston, New Brunswick, to a Mg-base bisulfite pulping operation with a 600-air-dry ton/day in a flow of 40.5 million gal/day (mgpd) to the primary and secondary effluent treatment facilities. Closing up of the bleach plant and boxboard machine are expected to reduce flow to the effluent treatment system to 21 mgpd. Neutralization of weak liquor at the evaporators (to decrease the volatility of acetic acid) and reuse of evaporator condensates (as quench water for cooking hot boiler gases and as makeup for the sulfur dioxide absorption system) are expected to reduce the BOD loading by 35%. (Swichtenberg-IPC)
W78-05470

DETOXIFICATION OF WOODROOM EFFLUENTS USING PHYSICAL-CHEMICAL TECHNIQUES,
Pulp and Paper Research Inst. of Canada, Pointe Claire (Quebec).
A. Wong.
In: Canadian Pulp and Paper Association, Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), p 111-118. 4 fig, 9 ref, 12 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Toxicity, Wood wastes, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Pulp and paper industry, Effluents, Bark, Ozone, Oxygen, Polyelectrolytes, Foreign countries, Canada, Biochemical oxygen demand, Suspended solids, Costs, Water pollution control, *Woodroom effluents, Newsprint mills, Aluminum sulfate.

The paper mill effluent is often nontoxic and woodroom effluent is extremely toxic in newsprint mills in eastern Canada with stone or refiner groundwood operations. Bark char from hog-fuel furnaces, alum, ozone, oxygen, and polyelectrolytes were used separately and in various combinations (e.g., alum and polyelectrolyte, bark char and polyelectrolyte, ozone and polyelectrolyte) to selectively treat samples of wood room effluents from Canadian mills. Toxicity, BOD and suspended solids were determined following treatment. Ozone, alum, and/or polyelectrolyte was more effective than bark char for the detoxification of woodroom effluent. Preliminary cost estimates for the ozone-polyelectrolyte approach gave an operating cost of ca. $0.45/metric dry ton of newsprint. (Swichtenberg-IPC)
W78-05472

STEAM STRIPPING OF CONDENSATES FOR REMOVAL OF ODOR, FIVE-DAY BOD, TOXICITY AND FISH TAINTING PROPENSITIES,
B. C. Research Ltd., Vancouver.
L. A. Gutierrez, J. C. Mueller, and C. C. Walden.
In: Canadian Pulp and Paper Association, Environment Improvement Conference, November 1-3, 1977, Moncton, New Brunswick, Preprints (CPPA Technical Section, Montreal), p 119-124. 18 ref, 8 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Odor, *Biochemical oxygen demand, *Taste, *Toxicity, *Fish, Wastes, Industrial waste, Water pollution sources, Waste treatment, Water pollution treatment, Phenols, Foreign countries, Canada, Steam, Sulfur compounds, Pulp and paper industry, Effluents, Water pollution effects, *Kraft mills, Condensates, Stream stripping.

Contaminated condensates contributed up to 20% of 5-day BOD, 20% of phenolic compounds, and 30% of toxicity to the total pollution load of an interior British Columbia bleached kraft mill. Steam stripping at low steam/condensate ratios (5.6%) effectively removed total reduced sulfur (95%), but 5-day BOD reductions were negligible (less than 5%). A survey of 5 mills operating steam strippers over a steam/condensate ratio range of 5.6-14.4% indicated great variability in phenolics removal (0.4-61%) and in toxicity removal (59-93%). This variability depended upon the design of the system (e.g., whether or not a rectification system was included). Steam stripping of contaminated condensates did not appreciably reduce the fish flesh-tainting propensities (due to phenolic loading) or the toxicity of total mill effluents. Coupled with poor phenolics removal from the condensates, appreciable phenolics loading was indicated in other process sewers (e.g., condensates from intermediate evaporator effects and brown stock washing losses). Observed toxicity removal was associated with total reduced sulfur removal. (Swichtenberg-IPC)
W78-05473

EVALUATION AND DESIGN OF MULTIPLE EFFECT EVAPORATION SYSTEMS FOR KRAFT BLACK LIQUOR,
Idaho Univ., Moscow. Dept. of Chemical Engineering.
L. Edwards, and R. Baldus.
In: TAPPI Engineering Conference, Atlanta, Georgia, September 19-22, 1977, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 141-145. 7 fig, 9 ref, 3 tab.

Descriptors: *Pulp wastes, *Evaporators, *Model studies, *Waste water treatment, Wastes, Industrial wastes, Water pollution sources, Design, Computer models, Computer programs, Steam, Pulp and paper industry, Effluents, Evaporation, Water pollution treatment, Dissolved solids, Temperature, Water conservation, Vapor pressure, *Black liquor.

Evaluation of the operating status of an existing evaporator plant (110 tons/hr capacity) was simplified by using the modular computer simulation system GEMS (acronym for General Energy and

Mateials-Balance System). The performance of each effect was determined from easily acquired mill data such as vapor temperatures and the dissolved solids concentration entering and leaving the plant. Parallel effects on the steam side presented no calculational problems. Modification of the existing evaporator plant by addition of another effect of equal area resulted in an increase in steam economy from 4.9 to 5.6 with little change in the capacity. Doubling the area of the additional effect resulted in a discharge concentration of 54.1%, a 4.5% increase in capacity. New technology such as vapor recompression and blow heat recovery was easily evaluated. An analysis of vapor recompression showed a steam economy of 8.2 when concentrating a stream from 13.9% to 18.3% solids. Plant expansions and new technology can be studied in detail eliminating costly trial and error methods in the mill. (Witt-IPC)
W78-05475

RECENT DEVELOPMENTS IN BLACK LIQUOR EVAPORATION (WITH 'REFERENCE TO INDIAN INDUSTRY',
Larsen and Toubro Ltd., Bombay (India).
K. Venkatramanan, and V. M. Mahagaonkar.
Ippta (Journal of the Indian Pulp and Paper Industry Technical Association), Vol. 13, No. 4, p 345-349, October/November/December, 1976. 2 fig.

Descriptors: *Evaporators, *Pulp and paper industry, *Pulp wastes, Equipment, Foreign countries, Research and development, Foreign research, Computer programs, Computer models, Water pollution sources, Wastes, Industrial wastes, Waste water treatment, Evaporation, Rheology, Physicochemical properties, Effluents, Hardwood, Grasses, Deciduous trees, *Black liquor, India, Kraft mills, Bagasse, Bamboo, Eucalyptus trees.

The research and development program at Larsen and Toubro Ltd., (Bombay, India) is attempting to determine the features of kraft mill black liquor evaporation which are unique to the Indian pulp and paper industry. Following studies of the physicochemical and rheological properties of black liquor, a computer program was developed to aid in the selection of evaporators. An evaporator with forced circulation was designed for high-viscosity black liquors, such as those derived from the sulfate digestion of grasses, bamboo, bagasse, eucalypts and mixed hardwoods. (Swichtenberg-IPC)
W78-05477

CONTRIBUTION TO THE DETOXIFICATION OF EFFLUENTS FROM THE SERIAL SYNTHESIS OF OXETANES, (IN FRENCH),
Paris-7 Univ. (France). Serv. Secur. Trav.
M. Halary-Marchat, and G. Casteignau.
Water Res 11 (1), p 57-64, 1977.

Descriptors: *Effluents(Detoxification), *Oxetanes synthesis, Biodegradation, *Waste water treatment, Acid hydrolysis, Kinetics, Toxicity, *Biological treatment.

The investigation concerns the purification of waste water from reactors where the -3.3 dialkyloxetanes are synthesized. After a study of the kinetics of acid hydrolysis of oxetane effluents, leading preferentially to formation of recyclable biodegradable diols-1,3 treatment is envisaged along 2 different processes, either biological or chemical-biological, with recovery of organic compounds and recycling with practically quantitative efficiencies. Copyright 1977 Biological Abstracts, Inc.
W78-05478

ECONOMIC ASSESSMENT OF WASTE WATER AQUACULTURE TREATMENT SYSTEMS,
Central State Univ., Edmond, OK. Dept. of Economics.
U. B. Henderson, F. S. Wert, and R. Jarman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 179, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-600/2-76-293, December, 1976. 107 p, 3 fig, 19 tab, 75 ref, 1 append. 1BC611, R803623.

Descriptors: *Cost-benefit analysis, *Feasibility, Aquatic animals, Southwest U.S., Municipal wastes, Waste water treatment, Tertiary treatment, Water quality, Sewage treatment, Aquiculture, Cost-effectiveness, Fish culture, Waste water utilization.

The economic viability of aquaculture as an alternative to conventional waste water treatment systems for small municipalities in the Southwestern region of the United States was investigated in a multiple water quality objective level cost-effectiveness model, which examined 15 waste water treatment strategies (11 with aquaculture systems and 4 without aquaculture). Estimates were made of the technical effectiveness and the present value of costs for all strategies. Estimates of the current value of revenues derived from sale of products produced in the aquaculture systems were made, and the impact of such revenues on total costs was analyzed. In all cases, when aquaculture was deemed capable of achieving a given water quality objective, the aquaculture system compared to a conventional system was cost effective. The cost differentials between aquaculture and conventional strategies were highly significant, ranging from 3.8% to 94%. While data limitations do exist, especially in the area of water quality estimates, it was concluded that aquaculture systems are low cost alternatives to conventional waste water treatment systems. The appendix contains schematics of treatment strategies. (Wares-IPA)
W78-05488

WASTEWATER SAMPLING, TRANSFER AND CONDITIONING SYSTEM,
Raytheon Co., Portsmouth, RI.
L. S. DiCola.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 906, Price codes: A05 in paper copy, A01 in microfiche. Report No. EPA-600/2-76-146, October 1976. 70 p, 20 fig, 6 tab, 4 ref, 4 append. ROAP 21-ASC; 1BB043; Task No. 20, 68-03-0250.

Descriptors: *Waste water(Pollution), *Waste water treatment, *Sewage, *Sampling, *Transfer, Automation, Automatic control, Operations, Chemical analysis, Computers, Research equipment, Process control, Sample transport system, Waste streams.

The construction and field evaluation of an automatic on-line hardware system for reliably sampling, transferring, and conditioning various wastewater treatment process streams are described. The treatments were designed so that the resulting transferred and conditioned samples would be suitable for interfacing with automatic on-line colorimetric and total organic carbon analyzers. Process streams to which this hardware system was successfully applied include raw sewage, primary effluent, secondary effluent, aeration tank mixed liquor, and return activated sludge. Analytical parameters used to evaluate the hardware system included both total and soluble organic carbon, orthophosphate, total hydrolyzable phosphate, and ammonia nitrogen. Results indicated that various streams within a typical municipal wastewater treatment plant can be monitored remotely and reliably. Recommendations are made for including such hardware systems in future plant expansions, in new plants, and as a portable installation at existing plants. The appendices contain information on statistical analysis, operation and maintenance, design specification guidelines, and equipment lists for the system evaluated. (Wares-IPA)
W78-05489

VIRUSES IN WASTE, RENOVATED, AND OTHER WATERS, 1975 LITERATURE ABSTRACTS.
Environmental Monitoring and Support Lab. Office of Research and Development.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-260 907, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-600/9-76-019, October, 1976, G. E. Berg, Ed. 30 p.

Descriptors: *Viruses, *Abstracts, Wastewater, *Waste water treatment, *Public health, Microorganisms, Aquatic microbiology, Aquatic microbiology, Water sewage, *Renovated water.

Abstracts of 102 published papers and books on viruses in waste, renovated and other waters are presented. (Seip-IPA)
W78-05490

CATALYTIC OXIDATION OF SULFIDE WASTE WATER FROM A CELLULOSE SPONGE-MAKING OPERATION,
Minnesota Mining and Mfg. Co., St. Paul.
R. A. Paschke, Y. S. Hwang, and D. W. Johnson.
Journal Water Pollution Control Federation, Vol. 49, No. 12, p 2445-2452, December, 1977. 4 fig, 7 ref, 1 append.

Descriptors: *Oxidation, *Catalysts, *Treatment facilities, *Chemical wastes, *Sulfides, Hydrogen ion concentration, Industrial wastes, Waste water treatment, Pilot plants, Aeration.

Laboratory and field tests were conducted to evaluate various waste water treatment processes for spent rinse water from a cellulose sponge plant operated by the 3M Company which contained about 200-300 mg/liter of sulfides. A catalytic oxidation system in which the sulfides in the waste water were oxidized in the presence of a catalyst, such as manganese sulfate or potassium permanganate, was selected on the basis of test results. A full-scale sulfide oxidation system consisting of a 17,000-gal surge tank followed by two 15,000-gal aerated reactors was constructed. Full-scale operation since 1975 has verified that sulfide wastes from cellulose sponge manufacturing can be successfully treated by pH adjustment to 8.5 and aeration in the presence of a manganese salt catalyst for a 1-2 hour period. Under these conditions, 90% of the sulfide was oxidized, yielding a total concentration in treated effluent of less than 9 mg/liter. A procedure was developed for measuring sulfide concentrations in waste water. (Schulz-FIRL)
W78-05492

TREATING AQUEOUS EFFLUENT TO REMOVE MERCURY--BY OXIDISING TO DIVALENT STATE AND EXTRACTING WITH AN ORGANIC SOLUTION.
Netherlands Patent NL 7704-650. Issued November 1, 1977. Derwent Netherlands Patents Report, Vol. Y, No. 46, p 3, October-November, 1977.

Descriptors: *Mercury, *Patents, *Chlorides, *Industrial wastes, *Pulp and paper industry, Paints, Agricultural chemicals, Water pollution sources, Chemical wastes, Waste water treatment.

An oxidation process for the removal of mercury from industrial waste water has been patented. Mercury in waste water is first reduced to a divalent state with an oxidizing agent: a reducing agent is used to remove the remaining oxidizing solution. The waste is then treated with an organic solution which contains a mercury-extracting agent. After the treated water is discarded, an aqueous chloride solution is used to recover the mercury as a concentrated mercury (II) chloride solution. Although the process is particularly useful for waste water from chlorine manufacture by mercury cathode electrolysis of sodium chloride,

it may also be applicable to the pharmaceutical, agriculture, paper, and paint industries. (Lisk-FIRL)
W78-05493

REMOVALS OF NONIONIC SURFACTANTS IN WASTE-WATER (HAISUI CHU NO HIION KAIMENKASSEIZAI NO JOKYO),
F. Yokota.
Kogai (Pollution Control), Vol. 12, No. 6, p 1-6, 1977. 6 fig, 3 tab, 9 ref.

Descriptors: *Surfactants, *Clays, *Montmorillonite, *Diatomaceous earth, *Zeolites, Adsorption, Waste water treatment, Industrial wastes, Isotherms, Water pollution sources.

The adsorption properties of five varieties of clay were evaluated for their ability to remove nonionic surfactants from waste water. Surfactants used in batch tests included: polyethylene glycol monolaury ether, polyoxyethylene alkylphenol ether, and polyoxyethylene sorbitan monostearate. Clays included: acid clay, montmorillonite, diatomaceous earth, clinoptilolite, and P-zeolite. Acid clay and montmorillonite were more effective at adsorbing surfactants than other varieties of clay. Acid clay was found to have the fastest adsorption rate, requiring 10-20 min in batch tests for effective removal of surfactants from waste water. Results of Freundlich adsorption isotherm tests verified that acid clay would be an effective medium for adsorption treatment of industrial waste water. (Lisk-FIRL)
W78-05494

TECHNOLOGICAL ECONOMICS APPLIED TO WASTE RECOVERY AND TREATMENT PROCESSES,
Aston Univ., Birmingham (England). Dept. of Chemical Engineering.
A. V. Bridgewater.
Effluent and Water Treatment Journal, Vol 17, No 11, p 589, 591, 593, 595-597, November, 1977. 1 fig, 6 tab, 7 ref.

Descriptors: *Waste water treatment, *Treatment facilities, *Economic feasibility, *Capital costs, *Cost comparisons, Capital costs, Operating costs, Economic efficiency, Return(Monetary), Risks, Industrial wastes.

Methods for the economic evaluation of waste treatment plant construction and operation are discussed. Evaluation of alternate waste treatment facilities may be made by the comparison of capital outlay with the rate of return from the plant. Evaluation techniques based on return on investment, incremental return on investment, and payback time are considered unrealistic because they rely on a return income which a treatment facility does not supply. The evaluation method considered to the most feasible for financial consideration of alternate treatment plants is net present worth. Net present worth is calculated from a summation of the present worths of income and the expenditure. Present worths and expenditure values are extrapolated for the expected life span of the facility. The net present worth technique is applied to an industrial waste treatment system designed to recover up to 200 tons/yr of copper from waste electrolysis solutions. The net present worth system provides a basis for comparison of alternate waste treatment facilities in situations where no income will be realized. (Lisk-FIRL)
W78-05496

TREATMENT OF ELECTROLESS NICKEL PLATING RINSE WATERS,
Agricultural Research Service, Peoria, IL.. Regional Research Lab.
R. E. Wing, W. E. Rayford, and W. M. Doane.
Metal Finishing, Vol 76, No 1, p 54-57, January, 1978. 6 tab, 27 ref.

Descriptors: *Nickel, *Lime, *Sodium compounds, *Industrial wastes, *Waste water treatment, Flocculation, Chemical precipitation, Liquid wastes, Sludge treatment, Reduction(Chemical).

Various treatment processes for electroless nickel plating rinse waters were compared in studies with several synthetically prepared and commercial baths. Solutions containing 10-500 ppm N; were contacted for 30 min with various concentrations of sodium hydroxide and ime and analyzed for residual N; concentrations after flocculation with an anionic polymer. Treatment of rinse baths with sodium hydroxide or lime at low pH proved effective in nickel removal. The lowest residual nickel concentrations were obtained from combined caustic-nickel treatment at high pH. When both sodium hydroxide and lime were used in the rinse bath treatment, polymer-treated floc settled more readily. Lime also enhanced the removal of reducing agents used in the plating process. A plating plant using a vendor U electroless nickel plating bath containing Ni+2 hypophosphite, citrate, and ammonia has reduced nickel discharge from 3.2 kg/day to 0.014 kg/day using the caustic-lime treatment at pH 12.0-12.5. The treatment was shown in laboratory experiments to be 95-98% effective on new bath rinse waters. (Lisk-FIRL)
W78-05497

SOLVENT EXTRACTION KINETICS IN THE RECOVERY OF METALS FROM EFFLUENTS AND OTHER SECONDARY SOURCES,
Leeds Univ., (England).
N. M. Rice, and M. Nedved.
Resource Recovery and Conservation, Vol 2, No 4, p 349-353, November, 1977.

Descriptors: *Separation techniques, *Kinetics, Interfaces, *Mass transfer, *Boundary processes, Solvent extractions, Industrial wastes, Chemical reactions, Waste water treatment, Copper, Iron, Nickel, *Metals recovery.

Reaction rates and extraction kinetics of the recovery of metals from waste by solvent extraction are examined. Extraction rates are limited by a slow reaction step in the process. The extraction mechanism is explained as a series of five consecutive steps occurring at the interface, including: reactant diffusion, reactant adsorption, chemical reaction, product desorption, and product diffusion. The five consecutive reactin steps are analyzed in an attempt to determine which step might be the rate controlling step. Expressions are presented for extraction kinetics where mass transfer and interfacial area do not control the rate. The effect of mass transfer is eliminated through the relaxation method. The effect of interfacial area is eliminated by operation at lower extractant concentration levels. The relaxation method allows a reaction to reach equilibrium. The equilibrium is then disturbed by a temperarure change or the addition of reactant and the rate at which equilibrium is again reached is measured. The order of reaction, the rate constant, and the rate-limiting step may be determined from analysis of these measurements. (Lisk-FIRL)
W78-05498

PURIFICATION OF WASTE WATERS WITH BIGUANIDE POLYMER--OR SALT THEREOF AS FLOCCULANT.
French Patent FR 2340-274. Issued October 7, 1977. Derwent French Patents Abstracts, Vol Y, No 47, p 4-5, January, 1978.

Descriptors: *Flocculation, *Pulp and paper industry, *Oil industry, *Chemical industry, *Patents, Industrial wastes, Solid wastes, Waste water treatment, Municipal wastes, Separation techniques, *Polymers, Salts.

A waste water treatment system using a biguanide polymer or a biguanide salt has been patented. Waste water contining suspended solids and microorganisms is treated with a biguanide polymer or salt to being about flocculation and precipitation of solids. Polymer chains of different lengths are combined to form the biguanide polymer. A flotation technique is used to remove the flocculted and precipitation solids. Depending on the waste water, relatively small amounts of the biguanide polymer, as little as 0.001-0.0001%, may be effective. This method of separation is effective in the treatment of domestic wastes as well as paper, chemical, pharmaceutical, and oil industry wastes. (Lisk-FIRL)
W78-05499

ULTRAFILTRATION OF BLEACH EFFLUENTS AS AN EXAMPLE OF WASTE-WATER TREAMENT BY ULTRAFILTRATION,
Danish Sugar Corp., Nakskov. Krifttenknisk Lab.
R. F. Madsen, and W. K. Nielsen.
Desalination, Vol 24, No 1-3, p 141-154, January, 1978. 8 fig, 10 tab.

Descriptors: *Filtration, *Membrane processes, Pulp and paper industry, *Lignins, *Sulfite liquors, *Pulp wastes, Bleaching wastes, Sulfates, Separation techniques, Waste water treatment, Industrial wastes, Design data, Membranes, Equipment.

The Danish Sugar Corporation has developed a membrane filtration system that can be used in the filtration of lignosulfonates from spent sulfite liquors and for colored compounds from bleach effluents from the pulp and paper industry. Ultrafiltration was used to fractionate glue-lignosulfonate, dispersing means, and raw materials from spent sulfite liquor. Combined ultrafiltration and diafiltration produced a very pure lignosulfonate. Hyperfiltration of dilute spent sulfite liquor at low concentrations reduced by the BOD by 94%. An integrated ultrafiltration-hyperfiltration-biological treatment system was devised. Ultrafiltration of bleach effluent was effective in reducing color by 95%, BOD by 30-40%, and COD by 90%. The membrane filtration system developed by the Danish Sugar Corporation contains plate-and-frame ultrafiltration modules which can be connected in series to provide large-scale, continuous treatment. Cost estimates for the treatment of 10 cu m of waste water per con of pulp were projected at $58,000 for equipment acquisition at an operating cost $2.80/ton. (Lisk-FIRL)
W78-05500

PAPER MILL WASTE PURIFICATION--BY PASSING THROUGH FILTRATION MATERIAL CONTAINING POSITIVELY CHARGED PERLITE PARTICLES.
Soviet Patent SU-544-450. Issued February 2, 1977. Derwent Soviet Inventions Illustrated, Vol Y, No 47, p 5, January, 1978.

Descriptors: Pulp and paper industry, *Filtration, *Patents, *Waste water treatment, *Polyelectrolytes, Industrial wastes, Cations, *Pulp wastes, Separation techniques, Water purification.

A treatment process for the filtration of paper mill waste water has been patented. Perlite, used in the filter, positively charged by treatment with a cation-active polyelectrolyte. The filter media is composed of 40-60% charged perlite and 60-40% uncharged perlite. This charged perlite filter system has been found effective in the separation of finely dispersed suspensions produced by the paper industry which contain differently charged particles at less than 0.5 millimicrons in diameter. This process can be conducted in one step and has been shown to be more effective than untreated perlite alone. The filtration rate and degree of clarification were improved in laboratory experiment with a 1% iron oxide pigment suspension when the positively and negatively charged perlite filtration media were used. (Lisk-FIRL)
W78-05501

HYGIENIC ASSESSMENT OF THE USE OF PURIFIED WASTE-WATERS IN CLOSED WATER CYCLES IN CARDBOARD FACTORIES (SANITARNOGIGIENICHESKAIA OTSENKA ISPOL'ZOVANIIA OCHISHCHENNYKH STOCHNYKH VOD V ZAMKNUTYKH TSIKLAKH VODOSNABZHENIIA KARTONOVYKH FABRIK),
G. V. Seliuzhitskii, L. V. Vorob'eva, and V. A. Zhigalov.
Gigiena i Sanitariia, No. 10, p 82-85, 1977. 1 fig.

Descriptors: *Sewage bacteria, *Industrial water, *Industrial wastes, *Water reuse, *Disinfection, *E. coli, On-site data collections, Pulp and paper industry, Pulp wastes, Chlorination, Waste water treatment, Waste water disposal, Biological treatment, *Recycling.

Results of bacteriological analyses of biologically treated waste water used in a closed-loop water system in a cardboard box manufacturing operation are presented. The waste water generated by the cardboard pressing machines was treated along with other waste water streams at the plant. Treatment included primary and secondary settling, followed by chlorination. E. coli, Enterococcus, and saprophytes were constantly present in the closed-loop system, indicating that disinfection by chlorination was inadequate. The overall bacteria count ranged 10,000-100,000/ml. Cardboard produced with recycled waste water was also contaminated with E. coli. The findings indicated the need for a more efficient method of disinfection within the biological treatment process. (Takacs-FIRL)
W78-05503

APPLICATION OF HIGH-TEMPERATURE HYPERFILTRATION TO UNIT TEXTILE PROCESSES FOR DIRECT RECYCLE,
Clemson Univ., SC. Dept. of Mechanical Engineering.
C. A. Brandon, and M. Samfield.
Desalination, Vol. 24, No. 1-3, p 97-112, January, 1978. 4 fig, 3 tab, 11 ref.

Descriptors: *Textile industry, *Membrane processes, *Filtration, *Waste water treatment, *Separation techniques, Toxins, *Recycling, Organic compounds, Industrial wastes, Chemical wastes.

Membrane processes were evaluated for the recovery of textile industry waste water and chemicals and for toxic emissions control. The recovery of waste water and chemicals which reach temperatures of 100C can be accomplished with high-temperature ultrafiltration and hyperfiltration. Savings of up to 50% in the energy costs for a textile industry operation were possible with hot water recycling. On-line techniques for the separation of toxins by ultrafiltration and hyperfiltration membrane processes produced effective waste treatment and recovery. A closed-loop water system using ultrafiltration and hyperfiltration was developed for a continuous textile dyeing process. The study indicated that several varieties of membranes were capable of removing 98-99% of the toxic elements which had a molecular weight greater than 90. Membrane processes were also shown to require less energy than other separation techniques and substantial savings were realized through heat recovery. (Lisk-FIRL)
W78-05505

OPTIMIZATION OF POLYMER FLOCCULATION OF HEAVY METAL HYDROXIDES,
McMaster Univ., Hamilton (Ontario). Dept. of Chemical Engineering.
P. M. Huck, K. L. Murphy, C. Reed, and B. P. LeClair.
Journal Water Pollution Control Federation, Vol. 49, No. 12, p 2411-2418, December, 1977. 5 fig, 8 tab, 8 ref.

Descriptors: *Mine water, *Flocculation, *Polymers, *Mixing, *Heavy metals, Mine wastes, Chemical precipitation, Chemical properties, Iron, Zinc, Copper, Optimization, Alkalis(Bases), Industrial wastes, Acid mine drainage, Waste water treatment.

The polymer properties and mixing conditions required for optimum flocculation of metal hydroxides from acid mine drainage were investigated in laboratory experiments with mine water containing various concentrations of iron, zinc, and copper. Simulated mine drainage and water obtained from a mine in New Brunswick, Canada, were used to examine flocculation efficiency with respect to polymer hydrolysis and concentration, heavy metal type, sulfate concentration, and the time and speed of dispersion and flocculation. Response surface analyses were used to determine the optimum parameter values. Mixing conditions had a greater effect than polymer properties on flocculation of mine drainage which had been neutralized to pH 9.5 with lime. The degree of polymer hydrolysis did not influence the level of treatment achieved with metal-bearing mine water. The minimum required reaction time decreased substantially as the waste strength increased. Residual metal concentrations under predicted optimum conditions for flocculation were similar for simulated and natural mine waters. The optimum polymer dosage was controlled by the metal:sulfate ratio, yielding a value of .0005 times the sulfate concentration at a metal:sulfate ratio of 0.3 by weight. (Schulz-FIRL)
W78-05506

POSSIBILITIES FOR ECONOMIC RECOVERY OF METALS FROM MINE DRAINAGE AND TAILINGS IN THE FRONT RANGE, COLORADO,
Colorado School of Mines, Golden. Dept. of Chemistry; and Colorado School of Mines, Golden. Dept. of Geochemistry.
For primary bibliographic entry see Field 5G.
W78-05507

TREATING AQUEOUS EFFLUENT CONTAINING DISSOLVED OR DISPERSED DYE--BY ADDING MAGNESIUM OXIDE THEN SEPARATING.
Belgian Patent BE-854-688. Issued May 20, 1976.
Derwent Belgian Patents Abstracts, Vol Y, No 47, p 2, November, 1977.

Descriptors: *Textiles, *Tannery wastes, *Dye dispersion, *Magnesium compounds, *Patents, Industrial wastes, *Separation techniques, Filtration, Centrifugation, Waste water treatment.

A patent has been issued for a treatment process for effluent from the textile dyeing and tanning industries. Aqueous effluent containing dissolved or dispersed dye is treated with magnesium oxide, preferably after the pH of the effuent has been adjusted to pH 6-8. A process such as decantation, filtration, or centrifugation is then used to separate the solid wastes from the liquid. The addition of magnesium oxide has also been found to be effective in the treatment of effluent from printing industries. When applied to effluent from this industry, the process has yielded favorable result in removing waxes, pastes, or vegetable oils from the waste liquid. The magnesium oxide treatment is considered more effective at color removal than conventional treatment processes. (Lisk-FIRL)
W78-05508

POLLUTION CONTROL IN TEXTILE DYEING INDUSTRY (SENSHOKU HAISUI ODOKU BOSHI GIJUTSU NI KANSURU KENKYU),
S. Owawa, T. Shirota, N. Aizaka, A. Shibuya, and J. Namiki.
Tsusansho Kogyogijutsuin Sangyo Kogai Kenkyu Choseikyoku 51 Nendo Kogai Tokubetsu Kenkyu Hokoku, Report of 1976 Pollution Special Research by Industrial Pollution Research Coordinative Bureau, Agency of Industrial Science and Technology, p 46-1 - 46-11, 1977. 17 fig, 2 tab, 13 ref.

Descriptors: *Textiles, *Dye dispersion, *Industrial wastes, *Solvent extractions, *Waste water treatment, Cellulose, Resins, Waste water disposal, Dyes, *Recycling, Model studies.

Methods of closed system, non-aqueous dyeing and pollution control for the textile industry have been examined by the Research Institute for Polymers and Textiles in Japan. A system model characterizing pollution sources in waste water based on input and output factors was devised. The model established patterns of variation of dyeing wastes in the water. Simulation tests with the model, waste water control could be accomplished by scheduling of dyeing processes. The properties of organic solvents used in the dyeing of synthetic fibers were studied and proper dyeing procedures were established. It was discovered that concurrent dyeing and finishing of cellulosic fibers could be achieved through the application of new reactive dyes and finishing resins in conjunction with high-frequency heating. (Lisk-FIRL)
W78-05509

KINETICS AND MECHANISM OF PHENOL ADSORPTION OF FLYASH,
Roorkee Univ., (India). Dept. of Civil Engineering.
P. Khanna, and S. K. Malhotra.
Indian Journal of Environmental Health, Vol 19, No 3, p 224-237, 1977. 11 fig, 1 tab, 11 ref, 1 append.

Descriptors: *Activated carbon, *Fly ash, *Industrial *Waste treatment, *Adsorption, *Phenols, Oil industry, Chemical wastes, Silicas, Aluminum, *Kinetics.

The kinetics and mechanisms of flyash removal of phenols from industrial effluents were investigated in batch studies which considered the phenol concentration in solution, the quantity of flyash added, the time of contact between adsorbate and adsorbent, and the pH of the solution. Phenols are found in wastes from industries such as synthetic rubber plants, oil refineries, steel mills, plastic plants, and coking plants. Activated carbon has been shown to be an effective adsorbent of phenol, but it is difficult to obtain and prohibitively priced in India. Flyash contains oxides of silica, aluminum, iron, and unincinerated carbon as a waste of thermal power production. The adsorptive capacity of flyash was found to increase at pH<10. Comparisons of the adsorption properties of activated carbon and flyash revealed carbon to be 3.6 times more adsorbent than flyash. The surface area of activated carbon was more than three times that of flyash. The maximum adsorption capacity of activated carbon would be 500-700 times greater than that of flyash, although activated carbon was about 20 times more expensive than flyash. (Lisk-FIRL)
W78-05510

TREATMENT OF PULP MILL EFFLUENTS,
Pulp and Paper Research Inst. of Canada, Pointe Claire (Quebec). (Assignee).
A. Wong, S. Prahacs, and J. Dorica.
United States Patent 4,008,161. Issued February 15, 1977. Official Gazette of the United States Patent Office, Vol. 955, No. 3, p 937, February, 1977.

Descriptors: *Pulp wastes, Pulp and paper industry, *Oxidation, *Clarification, *Patents, Industrial wastes, Chemical precipitation, Sludge treatment, Effluents, Activated carbon, Waste water treatment.

A patent has been issued for a multistep physical-chemical method for the treatment of pulp mill effluents. The process involves adsorption, catalytic

oxidation, and chemical precipitation of kraft pulp mill effluent which contains undesirable solid materials in suspended and/or dissolved form. Catalytic oxidation is brought about by passing oxygen-containing air through the waste water at a rate of 0.05-5.0 scfh/liter while the waste water is in contact with fine activated carbon at a concentration of 10-8000 mg/liter. A clarifying agent in the form of a coagulant, flocculant, and/or a polyelectrolyte is then added to produce chemical precipitation of undesirable materials. The polyelectrolyte concentration should be in the range of 0.1-20 mg/liter, while the coagulant and/or flocculant should be in the range of 10-2000 mg/liter. Gravitation, flotation, or centrifugation can then be used to separate out the suspended solids in the form of sludge. (Schulz-FIRL)
W78-05525

SELF-MONITORING PROCEDURES: BASIC PARAMETERS FOR MUNICIPAL EFFLUENTS.
Environmental Protection Agency, Cincinnati, OH. Municipal Permits and Operations Div.
For primary bibliographic entry see Field 5A.
W78-05528

WASTE WATER VALVE,
M. Varis, and K. Nordberg.
United States Patent 4,057,076. Issued November 8, 1977. Official Gazette of the United States Patent Office, Vol. 964, No. 2, p 428, November, 1977. 1 fig.

Descriptors: *Hydraulic valves, *Patents, *Equipment, *Sewage disposal, *Valves, Design data, Conveyance structures, Sewage treatment, Waste water treatment.

A patent has been issued for a waste water valve arrangement to be used in conjunction with a vacuum sewage disposal system. The valve arrangement includes a waste water collection chamber having: a waste water inlet; a closure member, to close the outlet passage and connect the collection chamber and the vacuum system; and a pressure-controlled device for operation of the closure system. A float, which is displaced by liquid level variations in the collection chamber, controls a pilot valve. The pilot valve is then used to control the vacuum in the sewage disposal system. (Schulz-FIRL)
W78-05529

NATIONAL WATER SUPPLY AND IMPROVEMENT ASSOCIATION (NWSIA): WATER REUSE AND DESALINATION FOR THE FUTURE.
National Water Supply and Improvement Association, Ipswich, MA.
For primary bibliographic entry see Field 3A.
W78-05532

SLUDGE CONCENTRATOR AND CONDITIONER,
A. Blok.
United States Patent 4,062,776. Issued December 13, 1977. Official Gazette of the United States Patent Office, Vol. 965, No. 2, p 638-639, December, 1977. 1 fig.

Descriptors: *Sludge treatment, *Filtration, *Flocculation, *Separation techniques, *Patents, Design data, Equipment, Liquid wastes, Polymers, Waste water treatment.

A device for sludge concentration and conditioning has been patented. Sludge and a flocculating polymer are introduced into the large inlet of a conical contact chamber. The contact chamber includes baffles mounted lengthwise on the inside of the chamber and weirs set end-to-end around the inside wall of the cone. The chamber rotates to mix the sludge and polymer, producing floc and filtrate. The mixture passes through a small outlet and into a conical screen drum through a large inlet. The conical screen drum, or concentrator chamber, rotates on a slightly inclined vertical support. The mixture's movement through the concentrator is slowed by a helical vane mounted on the inside of the drum. As the mixture moves toward the restricted outlet, the filtrate escapes through the screen of the chamber and floc is conveyed to the outlet by the drum's rotation and angle. A conduit connects the outlet of the contact chamber to the inlet of the concentrator. (Lisk-FIRL)
W78-05535

TRANSLATION OF REPORTS ON SPECIAL PROBLEMS OF WATER TECHNOLOGY, VOLUME 9 - ADSORPTION.
Karlsruhe Univ., (West Germany). Dept. of Water Chemistry.
For primary bibliographic entry see Field 5F.
W78-05544

PILOT-PLANT DEMONSTRATION OF WET OXIDATION FOR TREATMENT OF SHIPBOARD WASTEWATERS,
Barber-Colman Co., Santa Ana, CA. Resource Recovery Systems Div.
D. W. Bridges, and W. M. Fassel.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-028 812, Price codes: A18 in paper copy, A01 in microfiche. Report No CG-D-34-76, November, 1975. 398 p, 54 fig, 92 tab, 49 ref, 10 append. 4322.2.2. DOT-CG-31323-A.

Descriptors: *Oxidation, *Sewage treatment, *Waste water treatment, Ships, Prototypes, Research and development, Testing, Evaluation, Ammonium compounds, Water pollution control, Coast Guard, *Wet oxidation of waste water, Flushants, Pilot systems.

Two evaluation processes for the feasibility of wet oxidation for shipboard waste water treatment are demonstrated: (1) acidic wet oxidation of waste water and direct discharge of the effluent; and (2) ammoniacal wet oxidation and recycling of toilet flushings. Fifty gallon batches of waste water were treated in a full-scale (20-man) prototype system. Wet oxidation was effected in a continuous flow horizontal autoclave in which waste water and air were reacted concurrently in a series of stirred chambers. Percentage reduction in chemical oxygen demand ranged from about 65 to 95 in tests conducted on body sewage and simulated wastewaters from the galley and bilge. Laundry water proved indestructible; sodium lauryl sulfate, the most prevalent detergent, was unaffected. An engineering design is presented for a 20-man shipboard waste treatment system in which body sewage and solid galley waste are conducted through the reactor in an ammoniacal liquor which is recycled as flushant to recirculating toilets. Residual inorganic solids are removed by filtration. Steam is vented continuously to maintain a constant volume, and heat to sustain the process is drawn from exhaust gases from the ship's engines. The system can be operated for 60 days before the flushant must be changed and the accumulated solids removed from the filter. Appendices contain data on waste treatment test evaluation, batch data from experiments, estimation of performance, and demonstration of the system. (Wares-IPA)
W78-05545

HANDBOOK OF PROCEDURES, CONSTRUCTION GRANTS PROGRAM FOR MUNICIPAL WASTEWATER TREATMENT WORKS.
Environmental Protection Agency, Washington, DC. Office of Water and Hazardous Materials.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-260 649, Price codes: A03 in paper copy, A01 in microfiche. EPA Handbook, February, 1976. 178 p, 3 fig, 4 append.

Descriptors: *Federal Water Pollution Control Act, *Water quality standards, *Regulation, *Standards, *Waste water treatment, Water policy, Legal aspects, Legislation, Grants, Planning, Design, Construction, Water quality, Water pollution, Public Law 92-500(PL 92-500), Public Law 84-660(PL 84-660), Construction grants program.

This handbook identifies and explains in sequence the many procedures to be followed by Regional Offices and States in bringing municipal wastewater treatment projects from their conception to completion. The Handbook establishes uniform national operating standards which can be readily adopted and delineates specific tasks to be carried out in processing applications and monitoring grantee efforts. It describes actions necessary to the administration of the construction grants program under Public Law 92-500 of 1972 (a law which supersedes and augments the Federal Water Pollution Control Act of 1956) and other pertinent laws, rules, and regulations. The Handbook begins functionally with recommendations for the preapplication conference and proceeds through the completion of construction, including start-up and operation and maintenance requirements. Review procedures are separated into administrative and technical requirements and grouped together wherever possible. Chapters IV-VI describe the processing procedure for grant applications for Step 1 (Planning), Step 2 (Design), and Step 3 (Construction) projects. Chapter VII deals with financial considerations and information common to the processing of each category of grant, including eligibility costs and the processing of payment requests. (Seip-IPA)
W78-05546

DETECTION AND INACTIVATION OF ENTERIC VIRUSES IN WASTEWATER,
Hebrew Univ., Jerusalem (Israel). Environmental Health Lab.
H. I. Shuval, and E. Katzenelson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 210, Price codes: A14 in paper copy, A01 in microfiche. Report No. EPA-600/2-77-095, May 1977. 287 p, 39 fig, 31 tab, 246 ref. S-800990 (formerly 17060 EAM).

Descriptors: *Viricides, *Viruses, *Ozone, *Waste water treatment, Assay, Analytical techniques, Laboratory tests, Spectrophotometry, Water quality, Chlorine, Effluents, *Virus assay, *Enteric viruses, *Virus inactivation, Concentrating techniques, Fluorescent antibody technique, Cellulose nitrate membranes, Aluminum hydroxide, PE-60, Hollow fiber membranes.

Studies conducted between October 1969 and January 1975 on the development and evaluation of methods for concentrating and assaying low levels of viruses in large volumes of water as well as studies on the use of ozone in inactivating viruses in water and wastewater are reported. Of the eight virus concentration methods evaluated, filtration with cellulose nitrate membranes, aluminum hydroxide and PE-60 proved most promising. The feasibility of using hollow fiber membranes was demonstrated. A rapid method capable of detecting viruses in water in less than 24 hours using fluorescent antibodies was developed. A spectrophotometric method of detecting low concentrations of ozone in small (10 ml) samples of water was developed. Kinetic studies show that ozone inactivates enteroviruses more rapidly than chlorine under comparable conditions. With a 0.3 ppm residual, ozone inactivates 99% of seeded poliovirus in clean water in less than 10 seconds as compared to 100 seconds for chlorine. Although no detectable dose-response relationship could be demonstrated for ozone contact times greater than 10 seconds, preliminary studies indicate that such a relationship may exist for shorter contact times. The kinetic curve of virus inactivation having a rapid first stage lasting seconds followed by a slower stage lasting minutes may be associated

with virus clumping phenomenon. Ozone has been shown to kill viruses rapidly and effectively in wastewater effluent. (Seip-IPA)
W78-05548

DESIGN PROCEDURES FOR DISSOLVED OXYGEN CONTROL OF ACTIVATED SLUDGE PROCESSES,
Brown and Caldwell, Walnut Creek, CA.
M. J. Flanagan, and B. D. Bracken.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 960, Price codes: A11 in paper copy, A01 in microfiche. Report No. EPA-600/2-77-032, June, 1977. 217 p, 86 fig, 31 tab, 47 ref, 1 append. 68-03-2130.

Descriptors: *Dissolved oxygen, *Activated sludge, *Sludge treatment, *Aeration, *Automation, *Cost analysis, Economics, Costs, Operating costs, Capital costs, Maintenance costs, Manual control, Automatic control, Control systems, Equipment, Performance, Operations, Design, Maintenance, Application methods, Waste water treatment, Waste treatment, Sewage treatment, Water purification, Instrumentation, *Aeration equipment, *Activated sludge treatment plants, *Cost effectiveness, Economic analysis, Manual dissolved oxygen control, Automatic dissolved oxygen control, Control equipment.

Design procedures and guidelines for the selection of aeration equipment and dissolved oxygen (DO) control systems for activated sludge treatment plants are presented. Process configurations and design parameters are reviewed to establish system requirements. Aeration methods, equipment and application techniques, design systems, and control system selection procedures are examined. Recommendations for system applications to various aeration equipment types and process configurations are described. Performance, operational and maintenance data for aeration equipment and DO control systems for 12 activated sludge plants are presented in the appendix. Automatic DO control systems for various size hypothetical activated sludge system configurations are presented to develop an economic analysis of manual and automatic DO control. Conclusions indicate that capital and operating costs of automatic DO control systems are justified for activated sludge plants larger than 1 mgd (44 dm3/s) only if equipment is selected and applied in accordance with guidelines of the design manual and a power cost is applicable which is equal to or greater than the national average power rate. Areas in which further research is indicated are discussed. (Seip-IPA)
W78-05549

INVESTIGATION OF A HONEYWELL DISSOLVED OXYGEN PARAMETRIC SYSTEM,
Environmental Monitoring and Support Lab., Cincinnati, OH. Instrumentation Development Branch.
A. F. Mentink, J. O. Patterson, and T. E. Hickman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 564, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-600/4-77-023, April, 1977. 111 p, 49 fig, 17 tab, 43 ref, 2 append.

Descriptors: *Dissolved oxygen, *Activated sludge, *Sludge treatment, *Instrumentation, *Testing, *Theoretical analysis, *Measurement, Water pollution, Waste water treatment, Waste treatment, Sewage treatment, Water purification, *Honeywell DO Parametric System, Millivolt to voltage converter function transmitter, Sensor, Aeration tank.

A Honeywell dissolved oxygen parametric system (consisting of an in situ sensor assembly, 50 feet (15 m) of four-conductor shielded cabling and a millivolt to voltage converter function transmittor was investigated for possible application in EPA's research on sewage treatment. Functional layout and circuit diagrams and accumulated laboratory and field data are presented. Sensor and MV/V problems and maintenance requirements are described; manufacturer, prospective and final user recommendations are made. Summaries on selected background and theoretical aspects of the measurement are included. The system is functionally adequate and can be productively employed in a treatment process provided the manufacturer's instructions are followed. (Seip-IPA)
W78-05552

AIR MOBILE WASTEWATER RECLAMATION UNIT - 200 HOUR SERVICE TEST,
Army Mobility Equipment Research and Development Center, Fort Belvoir, VA. Sanitary Sciences Div.
J. G. Vlahakis.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A007 006, Price codes: A03 in paper copy, A01 in microfiche. Final Report No. AFCEC-TR-75-5, February 1975. 24 p, 7 fig, 5 tab, 4 ref. 64721F/2054/02 04, MIPR No. FICECS 4108.

Descriptors: *Laundering, *Water reuse, *Recycling, *Waste water treatment, Domestic waste, *Water purification, Waste water, Filtration, Liquid wastes, Hydrogen ion concentration, Turbidity, Biochemical oxygen demand, Detergents, Conductivity, Activated carbon, Diatomaceous earth, *Biological oxygen demand, *Total organic carbon, ERDLator, Waste water recycling unit, Cationic polyelectrode feeder, Jar tests, Air mobile.

In order to test the feasibility of treating laundry wastewater, such water was synthesized from several commercial laundry detergents and lubricating oil. A 200-hour service test was conducted on a 10,000 gallon-per-day prototype air mobile wastewater reclamation and recycling unit utilizing powdered activated carbon and cationic polyelectrode feeders, a mixing tank, a modified standard military water purification unit, and a diatomaceous earth filter. Adsorption-coagulation jar tests were performed to determine optimum type and dosages of carbon and polyme to be used in the unit; procedures, results, and data are presented. Treated wastewater was tested for turbidity, pH, detergent level, biochemical oxygen demand (BOD), conductivity, total organic carbon (TOC), and heavy metals; data are presented in tabular form. Conductivity, phosphate, and sulfate accumulations occur in feed and product water as a function of number of times water is recycled. Turbidity, detergent level, TOC, and BOD build-up in the product do not occur. Unit cost, based on a production buy of 10 to 25 units, is $30,500 to $28,500, respectively. It is concluded that this unit provides an effective method of treating and recycling synthetic cold laundry wastewater. (Seip-IPA)
W78-05553

ECOLOGICAL AND AESTHETIC IMPLICATIONS FOR THE MERRIMACK ESTUARY OF THE MERRIMACK BASIN WASTEWATER MANAGEMENT ALTERNATIVES,
Massachusetts Univ., Gloucester, Marine Station.
For primary bibliographic entry see Field 5C.
W78-05554

DEVICE FOR THE PURIFICATION OF WASTE WATER,
Landustrie Sneek Machinefabrik Elektrotechnik B.V. (Netherlands). (Assignee).
R. Pepping.
United States Patent 4,062,911. Issued December 13, 1977. Official Gazette of the United States Patent Office, Vol 965, No 2, p 671, December, 1977. 1 fig.

Descriptors: *Aeration, *Waste water treatment, *Activated sludge, *Patents, *Design data, Equipment, Sludge treatment, Water purification, Water treatment.

A patent has been issued for a waste water aeration device using the activated sludge method. The aeration device consists of a rectangular tank which has a partition placed parallel to and equidistant from the two longer walls of the tank. The partition should be shorter than the two long walls, thus forming a loop through which the waste liquid is moved. One or more surface aerators are installed near one of the longer walls. The body of the aerator rotates on a vertical axis, causing the waste water to flow around the loop formed by the tank walls and the partition. Baffles upstream of the aerator are positioned perpendicular to the longer walls. The baffles are of a length that will not obstruct the flow of the waste liquid when the baffles are in position. (Lisk-FIRL)
W78-05563

PROCESS FOR THE RECOVERY OF PRODUCTS FROM A WASTE STREAM IN THE MANUFACTURE OF ACRYLONITRILE,
Du Pont de Nemours (E. I.) and Co., Wilmington, DE. (Assignee).
J. A. Thorpe, and H. F. Porter.
United States Patent 4,065,486. Issued December 27, 1977. Official Gazette of the United States Patent Office, Vol 965, No 4, p 1512-1513, December, 1977.

Descriptors: *Waste water treatment, *Industrial wastes, *Ammonia, *Nitrogen, *Separation techniques, Heat treatment, Synthesis, Vapor compression distillation, Waste water disposal, Treatment.

A patent has been issued for a process that recovers reactants and products contained in the waste water from acrylonitrile production. The acrylonitrile is produced through the ammoxidation of propylene. The dilute aqueous stream contains hydrogen cyanide, acrylonitrile, ammonia, ammonium sulfate, and high-boiling nitrogen. A portion of the dilute waste water is first concentrated by partial extraction of water. This waste is mixed with dilute waste from the same stream and the mixture is heated. The liquid reaches a temperature of 105C as it passes through a heat exchanger at the rate of 6 ft/sec. At this temperature, the liquid is vaporized through a reduction in pressure. The vapor is returned to the acrylonitrile production process while a portion of the dilute waste stream is removed. (Lisk-FIRL)
W78-05599

METHOD OF TREATING WASTEWATER CONTAINING EMULSIFIED OILS,
Chrysler Corp., Detroit, MI. (Assignee).
D. D. Davidson.
U.S. Patent No. 4,040,955, 5 p, 3 ref; Official Gazette of the United States Patent Office, Vol 961, No 2, p 756, August 9, 1977.

Descriptors: *Patents, *Waste water treatment, Water pollution treatment, Industrial wastes, *Oil pollution, *Flocculation, Separation techniques, *Emulsified oils, Alum.

A floating oil adsorbing floc is formed in a batch of wastewater containing emulsified oils, separating most of the resulting clarified water from the oil laden floc, leaving a slurry or a relatively small quantity of the water plus the floc and the oil. The pH of the slurry is adjusted to cause a substantial portion of floc to dissolve in the retained water. In the case of alum, the pH is adjusted by a pH of about 3 or less. Consequently, the remaining floc becomes oil enriched. An addition quantity of wastewater to be treated is added to the slurry and floc reforms breaking the emulsion in the added wastewater. If pH adjustment is necessary at this point it is accomplished by appropriate acid or caustic addition. The oil laden floc is removed and the water if not clarified is subjected to additions

of more alum. In such a case, lesser amounts of alum will be required than was necessary in the first batch. The treatment may be carried on through a continuing series of successive batches of wastewater. (Sinha-OEIS)
W78-05600

METHOD OF AND APPARATUS FOR DIGESTING ORGANIC WASTE AND/OR SEWAGE SLUDGE,
Gebruder (Weiss K. G.), Dillenburg (West Germany). (Assignee).
F. X. Kneer.
United States Patent 4,062,770. Issued December 13, 1977. Official Gazette of the United States Patent Office, Vol. 965, No. 2, p 636-637, December, 1977. 1 fig.

Descriptors: *Aeration, *Digestion, *Aerobic treatment, *Patents, *Digestion tanks, Sludge digestion, Biodegradation, Design data, Organic wastes, Equipment, Sludge disposal, Sludge treatment, Waste water treatment.

An aeration unit for the continuous digestion of organic waste has been patented. The organic waste or sewage sludge is fed through an inlet to the upper portion of a vertically-positioned closed tank. The waste moves through the digestion tank in a continuous, single mass toward the outlet at the lower end of the tank. It is aerated along the entire cross-section of its mass as it passes toward the lower end of the tank. Sensors in the tank compare the moisture content, temperature, and air pressure in the waste with a predetermined set of desired values. The air, which moves in the opposite direction of the downflowing waste mass, is removed by a vacuum from the upper end the tank analyzed for carbon dioxide and oxyen content. The air removal system also controls the pressure of the air released into the waste mass. Monitors in the upper and lower portions of the tank compare the moisture content of the air with a predetermined set of values. The air moisture is controlled by the injection of a fine spray of water; the air temperature is maintained between 30 and 50C. A distributor, controlled by a blower, regulates the flow of air through the lower portion of the closed reactor tank. (Lisk-FIRL)
W78-05602

RECREATIONAL VESSEL WASTE POLLUTION,
Coast Guard, Washington, DC.
W. C. Bertges.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A000 453, Price codes: A07 in paper copy, A01 in microfiche. Report No. CG-D-112-74, June, 1974 138 p, 24 fig, 4 tab, 16 ref, 6 append. 744326.2.1.

Descriptors: *Recreation wastes, Recreation facilities, Water pollution sources, *Waste disposal, Water sports, Boating, Legislation, *Sewage treatment, Evaluation, Waste water treatment, *Marine sanitation devices, Marine pollution, Pumpout facilities.

The recreational vessel waste pollution problem is examined in light of a literature survey, the current state-of-the-art technology (including Federal research and development activities), and existing marine pollution legislation. All aspects governing the design, construction, installation, and operation of marine sanitation devices for recreational watercraft are covered, including the impacts on the public, the boat owner, the marine operators, and the boating industry. Marine sanitation devices are described and evaluated as to their applicability and feasibility for installation onboard recreational watercraft; evaluations are based on the respective operational and vessel characteristics and/or constraints that are necessitated by marine sanitation device engineering design criteria. A comparative analysis of the various sanitation system concepts is presented as to suitability for use on certain types of vessels. Shoreside pumpout facilities are also discussed. Conclusions indicate that recreational vesel statistics and information on their waste characteristics are inadequate. Three marine sanitation device concepts (maceration/disinfection, holding tank, and recirculating toilet) most effectively satisty restrictive conditions such as economics, operational and vessel limitations, and existing and pending pollution legislation. A general lack of shoreside receiving facilities is accompanied by a dearth of data. Expansion of the recreational vessel and vessel waste data base and study methods of treatment for such wastes is recommended. The appendices contain information onsanitation legislation and sanitation devices. (Wares-IPA)
W78-05621

PROTECTION OF SHELLFISH WATERS.
Environmental Protection Agency, Washington, DC. Office of Water Program Operations.
For primary bibliographic entry see Field 5G.
W78-05622

AUTOMATIC SLUDGE EXTRACTION AND WASHING DEVICE FOR USE IN A WATER TREATMENT SETTLING APPARATUS,
Societe Degremont Paris (France). (Assignee).
J. Tardivel.
United States Patent 4,059,531. Issued November 22, 1977. Official Gazette of the United States Patent Office, Vol. 964, No. 4, p 1266-1267, November, 1977. 1 fig.

Descriptors: *Sewage sludge, *Sludge treatment, *Sludge disposal, *Patents, *Separation techniques, Settling basins, Design data, Equipment, Waste water treatment, Municipal wastes.

An automatic method for the washing and extraction of sludge during settling treatment has been patented. The washing and extracting device is installed in a sludge settling bed contained in a decanter which has a sludge concentrator for removing settled sludge. One end of a siphon is introduced into the concentrator of the tank; the other end is connected to a manifold conduit which transports fluid to a sludge removal station. A valve connecting the siphon with a vacuum source controls the opening and closing of this channel. A second valve connects the siphon to the atmosphere; a third valve controls the opening and closing of the channel between the manifold conduit and the fluid source; a fourth valve opens or closes the channel between the manifold and the sludge removal station. When the first and fourth valves are in the open position and the second and third are in the closed position, a vacuum is used to extract the sludge from the concentrator into the siphon. The sludge is then transported through the manifold conduit to the sludge removal station. The washing process is achieved by reversing the extraction process. The first and third valves are set in the open position while the other two valves are closed. Fluid is introduced into the manifold conduit where it is drawn by the vacuum into the siphon. The fluid passes through the siphon into the concentrator where the fluid washes the concentrator and overflows, washing the bottom of the decanter. (Lisk-FIRL)
W78-05653

OZONE DISINFECTION AND OXIDATION IN A MODEL OZONE CONTACTING REACTOR,
Olin Corp., Brandenburg, KY.
J. Perrich, J. McCammon, L. Cronholm, M. Fleishman, and J. Pavoni.
AIChE Symposium Series, Vol. 73, No. 166, p 225-229, 1977. 5 fig, 5 tab.

Descriptors: *Oxidation, *Disinfection, *E. coli, *Ozone, *Viruses, *Sewage bacteria, Waste water treatment, Public health, Biocontrol, Microorganisms, Design criteria.

A semiflow batch reactor was used in laboratory studies to investigate ozonation mechanisms and rates and to evaluate the use of ozone for the inactivation of poliovirus and E. coli in waste water. Pseudo first-order kinetics were observed during the inactivation studies. The data suggested that there is no threshold ozone dose for viral or bacterial inactivation. Extremely low dose rates of ozone in buffered deionized water, 0.009 and 0.0008 mg 03/liter-min, produced significant inactivation of poliovirus and E. coli. The experimental data also suggested that standard laboratory frits and diffusers may catalytically decompose ozone in the gas phase. The addition of a nonnitrogenous carbonaceous compound in the form of dextrose enhanced virus inactivation. The addition of a non-nitrogenous carbonaceous compound in the form of dextrose ednhanced virus alanine had no effect on inactivation. In general, poliovirus was not as susceptible to inactivation by ozone than E. coli. Studies on inactivation mechanisms were inconclusive, although the data suggested that cell wall lysis did not occur in E. coli inactivation by ozonation. (Schulz-FIRL)
W78-05670

SEWAGE PURIFICATION SYSTEM.
United States Patent 4,059,521. Issued November 22, 1977. Official Gazette of the United States Patent Office, Vol. 964, No. 4, p 1263, November, 1977. 1 fig.

Descriptors: *Digestion, *Aeration, *Suspended solids, *Sludge treatment, *Patents, Design data, Sludge disposal, Waste water treatment, Equipment, Biological treatment.

A waste treatment system which combines aeration, digestion, and settling has been patented. Untreated liquid waste is passed through a series of closed, elongated tanks having horizontal axes placed end-to-end. Digestion of sludge in the first tank is accomplished through agitation of the waste and a separate aeration device. The treated sewage then passes into the second tank where solids are settled. A third closed collection tank is positioned at the lower portion of the second tank to receive the settled sludge. Suspended solid waste materials are further removed from the settled sewage in the third tank and are returned with the suspension component to the first tank for reagitation, reaeration, and continued digestion. The purified liquid separated from the settled sludge in the third tank is collected in another elongated tank from which the liquid is discharged into the ground. (Lisk-FIRL)
W78-05671

METHOD AND APPARATUS FOR WASTE WATER TREATMENT.
United States Patent 4,064,047. Issued December 20, 1977. Official Gazette of the United States Patent Office, Vol. 965, No. 3, p 1050-1051, December, 1977.

Descriptors: *Ozone, *Electrical grounding, *Electric conductance, *Patents, *Design data, Waste water treatment, Equipment, Waste water disposal, Municipal wastes, Treatment facilities.

A patent has been issued for an ozone absorption chamber and process for the treatment of waste water. The closed ozonization tank is equipped with a spray nozzle and outlet which connects the interior of the chamber with the exterior. The nozzle is installed in an electrically grounded interior wall with a conductive surface. A waste water inle attached to the spray nozzle conveys waste water to the chamber under controlled pressure. Before the waste water is released into the chamber, it receives an electrical charge. The water is distributed over the grounded inner wall in the form of a nonatomized spray which transfers its electrical charge to the electrically grounded wall upon contact. Pressurized ozone is then pumped through an inlet from the exterior of the chamber

into the waste water for thorough mixing. After ozonization is completed, waste water is removed from the chamber through an outlet. (Lisk-FIRL)
W78-05672

TOTAL WASTE RECYCLE SYSTEM FOR WATER PURIFICATION PLANT USING ALUM AS PRIMARY COAGULANT,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
L. K. Wang, and J. Y. Yang.
Resource Recovery and Conservation, Vol. 1, p 67-84, 1975. 4 fig, 10 tab, 34 ref. W/A 85-188 W/A 86-361.

Descriptors: *Flocculation, *Recycling, *Coagulation, Silts, Water purification, Waste water treatment, Sewage treatment, Water quality control, Water pollution, Wastes, Hydrogen ion concentration, Lime, Hydrogenated lime, *Alum recovery, *Alum, *Coagulant, Caustic soda, *Sodium hydroxide, *NaOH, *Sulfuric acid, *H2SO4, *Floc, *Waste recycle system, Zero waste discharge, Solubilization, Reuse, Reagents, pH, pH control.

A systems study of the feasibility of total recycle of wastes was conducted using actual wastewater and alum sludge collected from a water purification plant. Alum, used as a coagulant in raw wastewater flocculation and treatment, can be effectively recovered from waste sludge and reused when alum floc is solubilized with either sulfuric acid or caustic soda reagents. The solubilized reagent must be subjected to pH adjustments to regenerate alum for effective use as coagulant. However, if sufuric acid-regenerated filter alum and caustic soda-regenerated soda alum are used in combination as coagulant, the need for pH adjustment is eliminated. With elevation of treatment temperature and minimization of waste sludge aging, alum recovery efficiency is improved. Reuse of regenerated alum for water treatment does not give rise to contaminant build-up in the finished water. Optimum alum recovery process design parameters must be established before cost-effectiveness can be assessed. System flow charts and test data are presented in figures and tables. (Seip-IPA)
W78-05674

DISINFECTION WITH QUARTERNACY AMMONIUM COMPOUNDS,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering; and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5F.
W78-05677

TREATMENT OF TANNERY EFFLUENTS BY SURFACE ADSORPTION,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering; and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
L. K. Wang, D. B. Dahm, R. E. Baier, and R. C. Ziegler.
Journal of Applied Chemical Biotechnology, Vol 25, p 475-490, 1975. 2 fig, 9 tab, 12 ref, 2 append.

Descriptors: *Foam separation, *Adsorption, *Flotation, *Suspended solids, *Activated carbon, *Surfactants, Effluents, Waste water treatment, Water quality control, Water pollution, Water pollution treatment, Biochemical oxygen demand, Chemical oxygen demand, *Adsorbing colloid flotation, *Tannery effluent treatment, *Carbon adsorption and flotation, *Surface adsorption, Dimethyldihydrogenated-tallow ammonium chloride(DDAC), Carbon adsorption, Dissolved organics, Physiochemical.

Several types of surface adsorption for treating tannery effluents which contain such dissolved organics and suspended solids as: tannin, dissolved proteins, detergents, lime, dyestuffs, manure, chromium, sulphate, sulphide, chloride, ammonia, and particles of flesh are investigated. The processes studied include: (1) foam separation without additives, (2) adsorbing colloid flotation (foam separation using the colloidal surfactant dimethyldihydrogenated-tallow ammonium chloride (DDAC) as collector, (3) carbon adsorption, and (4) concurrent carbon adsorption and flotation. Results indicate that foam separation without additives is infeasible for the removal of either dissolved organics or suspended solids. Adsorbing colloid flotation is inefficient for the removal of dissolved organics but efficient for suspended solid removal provided that DDAC is used as a collector; this process is a good primary treatment step. Secondary treatment of tannery wastewater with carbon adsorption alone is not sufficient. The combination of carbon adsorption and flotation in one process, called adsorption flotation, is an effective means of treating the multicomponent dissolved and suspended wastes. Adsorption flotation followed by sedimentation or sand filtration can increase fractional reductions of suspended solids and turbidity to above 0.90. Foam separation apparatus design and operational details are presented. Effects of changes in parameters such as pH, gas flow rate, and DDAC dosage and treated effluent quality data are tabulated. (Seip-IPA)
W78-05680

STATE-OF-THE-ART: MILITARY EXPLOSIVES AND PROPELLANTS PRODUCTION INDUSTRY, VOL. I - THE MILITARY EXPLOSIVES AND PROPELLANTS PRODUCTION INDUSTRY,
American Defense Preparedness Association, Washington, DC.
For primary bibliographic entry see Field 5B.
W78-05684

PROCEEDINGS OF THE NATIONAL CONFERENCE ON SOLID WASTES MANAGEMENT, HELD AT UNIVERSITY OF CALIFORNIA, ON APRIL 4 AND 5, 1966.
Environmental Protection Agency, Washington, D.C.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 376, Price codes: A10 in paper copy, A01 in microfiche. April 1966, 214 p, 35 fig.

Descriptors: *Solid wastes, *Systems analysis, *Management, *Waste disposal, Waste treatment, Systems, *Solid waste management.

The problems of solid waste management are reviewed. Topics addressed include: urbanization, waste identification and characterization, technoloical and educational deficiencies, and economic and research restrictions. Detailed analyses of primary methods of disposal and waste composition are presented. Systems analysis is discussed in detail and is presented as a logical approach to complicated multi-variable problems in solid waste disposal. Problems in the application of systems analysis are due to a lack of generalized analytical models and pertinent data and to inadequate environmental objectives. Recommendations include: (1) appointment of a waste management coordinator; (2) establishment of environmental objectives; and (3) application of a systems approach to a specific problem. Facets which must be integrated into a management-science approach are discussed in detail and include legal, engineering, planning, political, business, refuse industry, and government issues. A Michigan solid waste management system is outlined and Los Angeles County's activities are described. Papers are presented on: (1) solid waste research using management science; (2) the coordination of management science with other solid waste research; and (3) the future of solid waste management. (Seip-IPA)
W78-05685

DEVELOPMENTS AT EIGHTH INTERNATIONAL CONFERENCE ON WATER POLLUTION RESEARCH.
Environmental Protection Agency, Washington, DC. Office of Research and Development.
For primary bibliographic entry see Field 5E.
W78-05686

WASTEWATER: IS MUSKEGON COUNTY'S SOLUTION YOUR SOLUTION,
Environmental Protection Agency, Chicago, IL. Office of Research and Development.
J. M. Walker.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 865, Price codes: A01 in paper copy, A01 in microfiche. Report No EPA-905/2-76-004, September, 1976. 51 p, 34 ref.

Descriptors: *Return flow, *Waste water, *Water reuse, *Michigan, *Irrigation systems, *Irrigation design, *Operating, Tertiary treatment, Crop production, Agriculture, Corn, *Waste water use, *Muskegon County Wastewater Management System(MICH), Crop yield, Spray irrigation.

The Muskegon County (Michigan) Wastewater Management System, which utilizes and renovates wastewater by land treatment, is described. The system consists of collection, transmission, aeration, storage, disinfection, spray irrigation, soil, crop, drainage, and monitoring components and is implemented on sandy, formerly unproductive soil to grow corn. The irrigation-soil-cropping phase of the wastewater treatment system is providing needed crop nutrients and advanced (tertiary) wastewater treatment. In 1975, over $100,000 worth of nitrogen, phosphorus, and potassium from the wastewater was utilized to improve soil and grow corn; from 0-89 pounds per acre of nitrogen fertilizer was added to the fields because of insufficient nitrogen content in the irrigation wastewater. The sale of corn reduced the $1.9 million operating cost for 1975 by about one-third. Operating costs for 1975 and 1976 were $0.24 per thousand gallons of wastewater. Average corn yields on 5,000 acres for 1974, 1975, and 1976 were 28, 60, 81 bushels per acre, respectively. Detailed information on capital and operating costs, land usage, irrigation systems, soil permeability, wastewater application, drainage systems, crop yields, planning and construction timetables, wastewater nutrient application, labor, and treatment performance is presented. (Seip-IPA)
W78-05687

CRITERIA FOR THE ESTABLISHMENT AND MAINTENANCE OF TWO YEAR POST HIGH SCHOOL WASTEWATER TECHNOLOGY TRAINING PROGRAMS, VOLUME I: PROGRAM CRITERIA.
Clemson Univ., SC. Dept. of Environmenta' Systems Engineering.
For primary bibliographic entry see Field 5G.
W78-05688

LABORATORY EVALUATION OF THE GATX EVAPORATIVE TOILET SYSTEM,
Naval Ship Research and Development Center, Annapolis, MD.
W. van Hees, and L. C. Gills.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-029 530, Price codes: A03 in paper copy, A01 in microfiche. Report No 3948, July, 1973. 53 p, 7 fig, 9 tab, 4 ref, 3 append. Task Area S4657 Prog. E1.63721N.

Descriptors: *Evaporation, *Sewage treatment, *Sewage sludge, *Ships, *Testing, *Evaluation,

*Maintenance, Waste treatment, Operations, Installation, *Evaporative toilet, Maximum repair time.

The evaporative toilet system (GATX) manufactured by General American Transportation Corporation, was evaluated in operation for 1853 hours for ocean-going mobile noise barge, MONOB YAG 61. A mean time between failures (MTBF) of 477 hours was demonstrated at a 90% confidence level. One critical failure, caused by the plumbing arrangement, occurred after 703 hours of operation. If this installation-related failure is not attributed to the GATX system, the MTBF is in excess of 800 hours. A maintainability demonstration involving 22 activities was unsuccessful due primarily to the design and installation locations of macerator/transfer pump and the evaporator/holding tank subsystems. The specified maximum repair time of 5 hours was exceeded by one hour; the excessive time is attributed to inaccessibility of the evaporator tank for maintenance. The specified 1 hour maximum repair time for the transport function was exceeded on two maintenance events. Installation problems, which could be avoided in future programs, are the main cause for one critical system failure and the failure to achieve maximum repair time of 5 hours. The odor of the water vapor released from the evaporator vent stack is the principal user objection to the system. Recommendations are made on ways to improve the reliability, maintainability, habitability, and performance of the GATX system. Use of the GATX system aboard Navy ships is recommended. (Seip-IPA)
W78-05691

BAFFLE FOR WATER OR SEWAGE SETTLING TANKS,
Sybron Corp., Rochester, NY. (Assignee).
R. F. McGivern.
United States Patent 4,059,529. Issued November 22, 1977. Official Gazette of the United States Patent Office, Vol 964, No 4, p 1266, November, 1977. 1 fig.

Descriptors: *Settling basins, *Waste water treatment, *Sludge disposal, *Patents, *Design data, Waste treatment, Sewage sludge, Sewage treatment, Waste water disposal, Equipment.

A baffle unit for waste water or sewage settling tanks has been patented. The baffle consists of an upright panel with a spacer extension installed on the wall of the settling tank where the waste inlet is located. One or more deflectors, afixed to the upright panel below the spacer, extend out from the panel toward the spacer. The deflector or deflectors direct the flow of waste upwards in the direction of the spacer. The upright panel is solid between the spacer and the deflector. Below the deflector, the upright panel contains a series of horizontal and vertical openings which allow the waste liquid to flow through the upright panel for settling treatment. (Lisk-FIRL)
W78-05693

METHOD FOR TREATING A WASTE WATER CONTAINING A NONIONIC SURFACE ACTIVE AGENT,
Lion Fat and Oil Co., Ltd., Tokyo (Japan). (Assignee).
M. Kinoshita, A. Okabe, and S. Ando.
United States Patent 4,057,495. Issued November 8, 1977. Official Gazette of the United States Patent Office, Vol 964, No 2, p 569, November, 1977. 1 fig.

Descriptors: *Foam fractionation, *Surfactants, *Foam separation, *Patents, *Separation techniques, Salts, Chemicals, Water reuse, Recycling, Industrial wastes, Waste water treatment.

A patent has been issued for a method of recovering a nonionic surface active agent from treated waste water. Foam separation is first used to produce two waste water fractions, one which contains more than 500 ppm of the nonionic surface active agent and one which contains less than 3 ppm. The initial concentration of the surfactant in waste water should be less than 500 ppm and preferably in the form of a polyoxyethylenealkylether, polyoxyethylenealkylphenylether, or fatty ester of polyethyleneglycol. An inorganic electrolyte, such as Na2SO4, K2SO4, Al2(SO4)3, Fe2(SO4), NaCl, KCl, CaCl2, FeCl3, or AlCl3, is added to the concentrated waste water fraction to yield an electrolyte concentration of more than 50 ppm. The solution is then heated to 100-200C under a pressure of 2-5 kg/cu cm to further concentrate the nonionic surface active agent. The purified water is then recycled to the foam separation step. (Schulz-FIRL)
W78-05694

APPARATUS FOR THICKENING AND EXTRACTING THE LIQUID FROM A SLUDGE,
Ichikawa Woolen Textile Co., Ltd., Chiba (Japan). (Assignee).
S. Nakamura, and S. Sasaki.
United States Patent 4,062,779. Issued December 13, 1977. Official Gazette of the United States Patent Office, Vol 965, No 2, p 639-640, December, 1977. 1 fig.

Descriptors: *Sludge treatment, *Dewatering, *Coagulation, *Equipment, *Patents, Screens, Filters, Industrial wastes, Waste water treatment.

A patent has been issued for a belt filter press to be used in sludge thickening and dewatering. The sludge thickening assembly used to coagulate the sludge includes two mesh-covered screen rolls connected by a conduit. The outer surface of each screen roll is covered with a reticulate material. The mesh covering the second screen roll is finer than that used on the first screen roll. The screen roll body consists of a number of wire rods in a cylindrical form, supported by an additional spirally-wound wire rod. The second screen roll is equipped with a press roll for extracting the liquid from the sludge. The press roll includes an endless, moving filter belt containing fibers which are aligned in a direction opposite to that of the filter belt's travel path. A cylinder is positioned to compress the sludge material against the moving filter belt, producing a dehydrated cake. (Schulz-FIRL)
W78-05695

PURIFICATION OF WASTE WATER FROM HYDRAZINE PRODUCTION,
Bayer A. G., Leverkusen (West Germany). (Assignee).
K-W. Eichenhofer, and R. Schliebs.
United States Patent 4,056,469. Issued November 1, 1977. Official Gazette of the United States Patent Office, Vol 946, No 1, p 213, November, 1977. 1 fig.

Descriptors: *Chemical wastes, *Patents, *Chemical reactions, *Oxidation, *Ammonium compounds, Chlorination, Organic compounds, Waste water treatment, *Hydrazine production.

A patent has been issued for a method to treat waste water produced during the manufacture of hydrazine. The waste water, contaning small amounts of hydrazine and organic hydrazine derivatives, is produced during the oxidation of ammonia or amine in the presence of ketone or an aldehyde. It is then intensively mixed with chlorine or a hypochlorite at a temperature of approximately 10-110C and a pH of 5-10 until the waste water's redox potential to platinum, relative to Ag/AgCl, is about -400 mV to +800 mV. (Schulz-FIRL)
W78-05696

ACTIVATED SLUDGE PROCESS,
Seisuikogyo Co. Ltd., Osaka (Japan). (Assignee).
T. Hasegawa, and S. Hasegawa.
United States Patent 4,055,490. Issued October 25, 1977. Official Gazette of the United States Patent Office, Vol 963, No 4, p 1323, October, 1977. 1 fig.

Descriptors: *Activated sludge, *Aeration, *Patents, Equipment, *Design data, Sludge treatment, Aeration, Waste water treatment.

A patent has been issued for an activated sludge process which employs an aeration tank having a narrowed, discharge conduit at its upper end. Waste water is introduced into the tank; and an oxygen-containing gas is added at the bottom of the tank. The gas flows up through the tank to the discharge conduit and in the process agitates and aerates the waste water. The activated sludge adheres to a number of free-floating, spongy particles in the tank. An air lift effect causes the particles to be lifted toward the discharge conduit. The spongy particles are periodically allowed to exit the tank via the discharge conduit. The spongy pieces then pass to a head tank equipped with pressing rolls. The sludge is extracted and the spongy pieces are prepared for recycling to the aeration tank. (Schulz-FIRL)
W78-05697

METHOD OF DEWATERING MATERIAL CONTAINING SOLID MATTER AND BOUND AND UNBOUND WATER,
Resources Conservation Co., Renton, WA. (Assignee).
H. H. Peters.
United States Patent 4,056,466. Issued November 1, 1977. Official Gazette of the United States Patent Office, Vol 964, No 1, p 212, November, 1977. 1 fig.

Descriptors: *Dewatering, *Sludge treatment, *Organic compounds, *Patents, Chemical reactions, Coagulation, Separation techniques, Waste water treatment.

A chemical process for dewatering sludge has been patented. The dewatering process is based on the mixture of an amine with the sludge. The amine consists of nitrogen, hydrogen or alkyl, and two alkyl radicals having from one to six carbon radicals or alkenyl radicals which have from two to six carbon atoms, yielding a total of three to seven carbon atoms in the molecule. The amine should also have an inverse critical solution temperature in a two phase system with water. The temperature of the mixture is adjusted to below the critical solution temperature to yield a liquid and a solid phase. The solid material can then be separated from the liquid phase, with improved results if the inverse critical temperature is maintained until the separation is complete. (Schulz-FIRL)
W78-05698

PRODUCTION OF NON-BULKING ACTIVATED SLUDGE,
Air Products and Chemical Products, Inc., Allentown, PA. (Assignee).
M. L. Spector.
United States Patent 4,056,465. Issued November 1, 1977. Official Gazette of the United States Patent Office, Vol 964, No 1, p 212, November, 1977. 1 fig.

Descriptors: *Activated sludge, *Biochemical oxygen demand, *Patents, *Anaerobic conditions, *Sludge treatment, Aeration, Waste water treatment.

A patent has been issued for a process which inhibits the proliferation of filamentous biomass in the activated sludge process. Recycled activated sludge is mixed with BOD-containing influent in an initial contact zone. Anaerobic conditions are maintained in the contact zone to provide an environment which is essentially free of nitrogen oxides and contains less than 0.7 ppm dissolved ox-

ygen. The growth of nonfilamentous organisms which sorb BOD is thus favored. The mixed liquor then passes to an oxygenated zone where the dissolved oxygen content is at least 1 ppm to facilitate oxidation and removal of the BOD. The waste water then passes to a settling zone where the purified supernatant liquid is separated from the settled sludge. A portion of the settled sludge is returned to the initial contact zone for mixing with the BOD-containing influent. (Schulz-FIRL)
W78-05699

APPARATUS FOR TREATING SEWAGE SLUDGE,
Orgonics, Inc., Slatersville, RI. (Assignee).
J. M. O'Donnell.
United States Patent 4,057,392. Issued November 8, 1977. Official Gazette of the United States Patent Office, Vol 964, No 2, p 536, November, 1977. 1 fig.

Descriptors: *Sludge treatment, *Patents, *Fertilizers, *Drying, *Equipment, Sludge disposal, Heat treatment, Sewage treatment, Waste water treatment.

A patent has been issued for a sludge treatment apparatus designed to produce a granular, high nitrogen product for use as animal feed or fertilizer. The particle size of the sludge filter cake is reduced on a continuous moving bed. A rotating raking reel shreds the filter cake; a rotating levelling reel evens out the bed of shredded sludge material; and the sludge is transported to a mixing area. A rotating shaft within an elongated vessel is used to agitate and homogenize the shredded sludge material. The vessel has inlet and outlet sections and the shaft is equipped with a number of paddles. Acidic material can be introduced into the reaction chamber of the mixing vessel and the temperature can be controlled within the range 30-80C. An aqueous condensable methylol-prepolymer solution can also be added to the reaction vessel. The moisture content of the discharged reaction product is reduced to less than 10%. The mixture can be screened to the desired particle size. (Schulz-FIRL)
W78-05700

5E. Ultimate Disposal Of Wastes

MICROBIAL AEROSALS FROM FOOD-PROCESSING WASTE SPRAY FIELDS,
Army Dugway Proving Ground, UT.
D. T. Parker, J. C. Spendlove, J. A. Bondurant, and J. H. Smith.
Journal Water Pollution Control Federation, Vol. 49, No. 12, p 2359-2365, December, 1977. 4 tab, 3 fig, 6 ref.

Descriptors: *Food processing industry, *Coliforms, *Aerosols, *Sprays, *Waste water disposal, Potatoes, Mathematical models, Environmental effects, Analytical techniques, Bacteria, Model studies, Organic wastes, Waste water treatment.

Studies were made of microbial aerosals from spray fields used for the disposal of potato processing waste water. Samples of the aerosals collected downwind from the spray-fields contained predominately starch fermenters. Coliforms comprised about 0.07% of the total microbial population. Less than 10% within this fraction was of the Escherichia coli variety, as determined by growth on Endo's agar. The coliform population appeared to originate from soil removed from the potatoes during washing; the starch fermenters were apparently derived from the waste water settling tanks. The concentration of assessable microbial aerosol particles was estimated to be 127 particles/cu m of air at 10 m downwind of the spray field when meterological conditions favored downwind transport. With the multi-stage sampling procedure used, this concentration could not be distinguished from background levels at distances less than 2 kilometers from the spray field. An area source model was developed for calculation of the ground-level concentration of the aerosol at a given distance from the downwind edge of an area source. (Baker-FIRL)
W78-05290

FISH BY-PRODUCTS--FISH MEAL AND FISH SILAGE,
Ministry of Agriculture, Fisheries and Food, Hull (England). Humber Lab.
D. P. Potter, I. N. Tatterson, and J. Wignall.
Process Biochemistry, Vol 13, No 1, p 22-23, 26, January, 1978. 6 fig, 3 tab, 7 ref.

Descriptors: *Fishing, *Demersal fish, *Feeds, *Eels, *Food processing industry, Proteins, Vitamins, Calcium, Phosphorous, Potassium, Magnesium, Trace elements, Enzymes, Byproducts, Waste water treatment, Industrial wastes.

Raw material sources and process methods for the production of protein-rich fish meal and fish silage from the waste waters and byproducts of the fishing industry are reviewed. Diminishing supplies of edible-fish waste for the production of fish meal have prompted an increase in industrial fish catches to supplement condemned fish and fish processing wastes. Industrial fish, usually inedible or found in large quantities, are used in England for the production of fish meal and include sand eels, Norway pout, sprats, mackeral, and blue whiting. Fish meal production from industrial fish requires an additional oil extraction process not required for white fish meal containing less than 6% oil. Coagulation of the protein in the industrial fish is accomplished by cooking; oil and water are removed in the form of a press cake. Press liquor is screened and centrifuged for oil removal; the remaining stickwater, containing dissolved and suspended protein solids, is concentrated by evaporation and returned to the press cake for drying. The fish meal has a high protein and amino acid content and is rich in minerals, vitamins, and trace elements. Fish silage production, an alternative use for fish wastes, involves liquifying the wastes, with indigenous proteolytic enzymes in an acidic environment. The fish silage production method is adaptable for processing of catches at sea. (Lisk-FIRL)
W78-05291

OMC-LINCOLN MEETS TOUGH DISCHARGE ORDINANCE.
For primary bibliographic entry see Field 5G.
W78-05300

PILOT-SCALE STUDIES OF THE LEACHING OF INDUSTRIAL WASTES IN SIMULATED LANDFILLS,
For primary bibliographic entry see Field 5B.
W78-05303

INVESTIGATIONS INTO DEHYDRATION OF DEPOSITS FROM THE PURIFICATION PLANT FOR GRINDING WASTE MATERIAL OF CRYSTAL GLASS MANUFACTURING PLANTS (BADANIA NAD ODWADNIAMIEM OSADOW Z OCZYSZCZALNI SCIEKOW POSZLIFIERSKICH Z HUT SZKTA KRYSZTATOWEGO),
Technical Univ. of Warsaw (Poland). Inst. of Environmental Engineering.
S. Guberski, K. Badowska, and L. Stefanska.
Gaz, Woda i Technika Sanitarna, Vol. 51, No. 5, p 136-138, 1977. 5 fig, 4 tab, 7 ref.

Descriptors: *Settling basins, *Filtration, *Dewatering, Industrial wastes, Metals, Lead, Silica, Centrifugation, Waste water treatment.

Results of studies on the dewatering of sludges generated during the treatment of waste water from grinding and polishing operations in crystal and glass manufacturing are presented. The solids, consisting mainly of particles of glass, metal, felt, cork, and processing discs, were first washed into settling tanks. The waste water was then coagulated, yielding a sludge with a high moisture content in the secondary settling tanks. Samples of waste water were collected from various locations within the plant and sludge was obtained from the initial settling tanks. The samples were dried at 105C to constant mass and weight-proportioned composites were analyzed. Analyses indicated that the waste materials consisted primarily of SiO2 (40.1%), Pb (16%), Na (11.5%), Ba (8%), and Al (8%). Preliminary tests indicated that the sludges could be successfully dewatered by air drying, vacuum filtration, belt filter pressing, or centrifugation. (Tallert-FIRL)
W78-05310

THE PRODUCTION OF CHEMICALS FROM PULPING WASTE,
Swedish Forest Products Research Lab., Stockholm.
K. Kringstad.
Tappi, Vol. 61, No. 1, p 49, January, 1978. 1 tab.

Descriptors: Pulp and paper industry, *Sulfite liquors, *Pulp wastes, *Lignins, *Carbohydrates, Chemicals, Oil, *Industrial wastes, Softwood, Waste water treatment.

A cost analysis of chemical production from pulping industry wastes was performed. A comparison with costs of petroleum produced chemicals was also included. Based on pulping wastes produced in Sweden in 1973, kraft liquor yielded 3 million tons of lignins and sulfite liquor produced 1 million tons. Production costs for lignins were comparable to or lower than amino resin production costs and were lower than phenolic resin production costs. Petrochemical production of formic, acetic, lactic, and isosaccharinic acids was found to be less costly than the production of these acids from spent kraft liquors. Ethanol production from the fermentation of sulfite liquor carbohydrates required three to four times more energy than petrochemical ethanol production. Bark and foliage from softwoods were found to contain phenolic material, lignin-like material, carbohydrates, protein, chlorophyll, and certain extractives. Hardwoods yielded betulinol and suberin, used for the production of polyesters. None of these raw materials as potential chemical sources were found to be as cost effective as petrochemical sources at the present time. (Lisk-FIRL)
W78-05316

PULP AND PAPER RESEARCH AT UQTR--RELIEF FOR AN EMBATTLED INDUSTRY,
M. Brochu.
Science Dimension, Vol 9, No 5, p 28-29, 1977.

Descriptors: *Pulp and paper industry, *Industrial wastes, *Recycling, *Feeds, *Poultry, *Pulp wastes, Waste disposal, Nutrient removal, Biological treatment, Waste water treatment, Waste water disposal.

Pulp mills are a major source of water pollution in the province of Quebec, Canada. A medium-sized mill can use as much water and pollute a river to the same degree as does a small city. A cheap, efficient biological method has been sought for treating effluents from sulfite pulp mills. Biological treatment is a relatively simple process. Residual liquor is mixed in a tank with a small quantity of chemical fertilizer and specially-selected bacteria. These microorganisms remove carbohydrates from the residual liquor and produce a sediment scientists call biomass. Biomass solids, which contain 38% protein, 47% carbohydrates as well as some vitamins, appear promising as a food supplement. Well balanced chicken feeds have been prepared by combination of biomass with a

vitamin supplement. Biomass-fed chickens are reported to have a normal growth rate and tase. Experiments with larger animals are planned. The economic feasibility of biomass exploitation is being studied. Possible uses for the other major component of pulp effluent, lignosulfonates, are also being investigated. (Baker-FIRL)
W78-05321

IS CHEAP RECOVERY IN SIGHT FOR SULFITE.
Canadian Chemical Processing, Vol 61, No 11, p 32-33, November, 1977. 1 fig, 1 tab.

Descriptors: *Sulfite liquors, *Incineration, *Separation techniques, *Pulp and paper industry, *Industrial wastes, Recycling, Evaporation, Water reuse, Chemical wastes, Waste water treatment.

Waste stream incineration is considered as a method for recovery of chemicals in sulfite pulp mill waste water. Advanced evaporator/incinerator systems is now available at lower capital cost than was previously possible. Before the waste liquor can be incinerated, it must be concentrated . Ion exchange and electro-dialyis have been successfully used on a limited basis, but it appears that evaporation is clearly the best general method of concentrating sulfite waste liquor. Various systems, including the fluidized bed reactor, have recently been introduced for incineration of concentrated pulping liquor and recovery of the pulping base. In nearly all cases, combustion of the liquor provides most of the heat required for the evaporators. Specific processes are briefly discussed. (Baker-FIRL)
W78-05322

MINI-SYMPOSIUM ON EFFLUENT CONTROL 'UPDATE 1976--GROUP IV',
Waste Water Engineers, Inc., Nashville, TN.
For primary bibliographic entry see Field 5D.
W78-05329

TREATMENT PLANT AT REDBOURN.
For primary bibliographic entry see Field 5G.
W78-05331

COMMUNITY RESPONSE STRATEGIES FOR ENVIRONMENTAL PROBLEMS OF WATER SUPPLY AND WASTEWATER DISPOSAL IN FAIRBANKS, ALASKA,
Alaska University, College. Inst. of Water Resources.
For primary bibliographic entry see Field 5G.
W78-05357

ABATEMENT OF MALODORS AT CONFINED DREDGED MATERIAL DISPOSAL SITES,
Argonne National Lab., IL.; and Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W78-05360

BIOLOGICAL ASSESSMENT OF THE SOLUBLE FRACTION OF THE STANDARD ELUTRIATE TEST,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W78-05366

PRELIMINARY DESIGN OF OCEAN OUTFALL AT SYDNEY: PROTECTION OF BATHING WATERS,
Caldwell Connell Engineers, Melbourne (Australia).
For primary bibliographic entry see Field 5B.
W78-05377

SOLID WASTE MANAGEMENT PLAN, (LEHIGH-NORTHAMPTON COUNTIES JOINT PLANNING COMMISSION).
Weston (Roy F.) Inc., West Chester, PA.
For primary bibliographic entry see Field 5G.
W78-05395

SOLID WASTE MANAGEMENT PLAN-1977 SUPPLEMENT (LEHIGH-NORTHAMPTON JOINT PLANNING COMMISSION),
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
For primary bibliographic entry see Field 5G.
W78-05396

ALTERNATIVES TO THE MANAGEMENT OF HAZARDOUS WASTES AT NATIONAL DISPOSAL SITES. VOLUME II. APPENDICES.
Little (Arthur D.) Inc., Cambridge, MA.
For primary bibliographic entry see Field 5G.
W78-05418

APPLICATION OF THERMAL IMAGERY AND AERIAL PHOTOGRAPHY TO HYDROLOGIC STUDIES OF KARST TERRANE IN MISSOURI,
Geological Survey, Rolla, MO. Water Resources Div.; and Missouri Dept. of Natural Resources, Rolla. Div. of Geology and Land Survey.
For primary bibliographic entry see Field 5G.
W78-05441

ST. LOUIS REFUSE PROCESSING PLANT: EQUIPMENT, FACILITY AND ENVIRONMENTAL EVALUATIONS,
Midwest Research Inst., Kansas City, MO.
L. J. Shannon, D. E. Fiscus, and P. G. Gorman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-243 634, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-650/2-75-044, May 1975. 110 p, 15 fig, 58 tab, 1 ref, 1 append. 1AB013; ROAP-21AQQ-010, 68-02-1324, Task 4.

Descriptors: *Air pollution, *Water pollution, Wastes, Waste treatment, Waste disposal, Environmental effects, Evaluation, Operations research, Municipal wastes, Chemical analysis, Equipment, Missouri, St. Louis(MO), *Refuse processes, Combustion, Particulates.

Partial results of tests and evaluations of the St. Louis, Missouri refuse processing plant's equipment, facilities, and environmental impacts are reported. Studies were made on plant mass and energy balances, equipment and plant performance, and plant operating costs. Particulate emission tests were performed on the hammermill and air classification system dust collection cyclones; a pollution evaluation of plant washdown water and a plant sound survey were carried out. The plant operated satisfactorily during the evaluation period, with about 80% of the incoming refuse converted to refuse fuel, on both a mass and energy basis. No major equipment breakdowns occurred. Plant operating and maintenance costs ranged from $2.58 to $14.80/ton of refuse produced, with costs varying primarily as a function of tonnage. Particulate emissions from the hammermill cyclone discharge were less than 0.01 g/dscf; those from the air classifier cyclone discharge averaged 0.209 g/dscf (about 1.25 lb/ton of refuse processed). Over 80% by weight of these particles had mean diameters greater than 10 micrometers. Washdown water samples showed significant increases in total suspended solids, biological oxygen demand, and chemical oxygen demand; however, the small quantity of effluent could be handled easily by the average municipal waste treatment facility. At eight of the 17 plant positions where sound measurements were taken, sound levels were over 90 dBA (the maximum OSHA level for continuous eight hour exposure). The appendix presents data on equipment and analysis of refuse samples. (Wares-IPA)
W78-05487

ECONOMIC ASSESSMENT OF WASTE WATER AQUACULTURE TREATMENT SYSTEMS,
Central State Univ., Edmond, OK. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W78-05488

HEAVY METAL ENRICHMENT IN MINE DRAINAGE: IV. THE ORANGE FREE STATE GOLDFIELD,
Pretoria Univ., (South Africa). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W78-05491

ANALYSIS OF ORGANIC MATTERS IN KRAFT PULP MILL EFFLUENT IN HIRO BAY (HIROWAN KURAFUTO PARUPU KOJO HAISUIKO FUKIN NO YUKIBUTSU NO BUNSEKI),
Government Industrial Research Inst., Hirohata (Japan).
For primary bibliographic entry see Field 5A.
W78-05502

PILOT-PLANT DEMONSTRATION OF WET OXIDATION FOR TREATMENT OF SHIPBOARD WASTEWATERS,
Barber-Colman Co., Santa Ana, CA. Resource Recovery Systems Div.
For primary bibliographic entry see Field 5D.
W78-05545

DESIGN PROCEDURES FOR DISSOLVED OXYGEN CONTROL OF ACTIVATED SLUDGE PROCESSES,
Brown and Caldwell, Walnut Creek, CA.
For primary bibliographic entry see Field 5D.
W78-05549

COMPREHENSIVE SUMMARY OF SLUDGE DISPOSAL RECYCLING HISTORY,
Metropolitan Denver Sewage Disposal District No. 1, Commerce City, CO.
J. C. Baxter, W. J. Martin, B. R. Sabey, W. E. Hart, and D. B. Cohen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-269 352, Price codes: A05 in paper copy, A01 in microfiche. Report No. EPA-600/2-77-054, April, 1977. 85 p, 19 fig, 32 tab, 6 ref, 1 append. 68-03-2064.

Descriptors: *Sludge disposal, *Sludge treatment, *Sludge, *Pollutant identification, Waste disposal, Sewage disposal, Plant growth, Germination, Bacteria, Coliform, Aerobic digestion, Incineration, Drying, Biodegradation, Colorado, *Land application, *Plant emergence, *Microbial count, *Sludge application, Denver.

Since 1971 the only mode of sludge disposal used by the Metropolitan Denver Sewage Disposal District No. 1 has been land application. The development of methodology and problems (heavy metal buildup in soils and plants, pathogen dissemination, nitrate pollution of groundwater) associated with each of the several different procedures which have been implemented over the intervening years since 1971 are discussed. Continuous excessive applications of sludge to the soil at the Lowry Bombing Range since 1969 have raised the concentration of nutrients, metals, salts and organic matter; the effects on soil, crops and environment are evaluated. The effects of various sludge applications to soil on germination, emergence, subsequent plant growth and heavy metals uptake are discussed. Low germination and emergence rates were found when crops were planted immediately after sludge incorporation. Increased soil sludge incubation periods resulted in decreased germination inhibition, possibly attributable to the influence of salts or some volatile component of the sludge. Microbial counts

showed that sludged plots had an appreciable increase in total aerobic, total coliform, and fecal streptocci bacteria. Counts of fecal coliform bacteria showed no appreciable differences from control plots after a 6-month incubation period. Air drying of liquid sludge in shallow earthen drying basins showed that water is lost through soil percolation in addition to evaporation and that about half of the nitrogen content of sludge is lost during the drying process. Future research needs are discussed. (Seip-IPA)
W78-05550

SITE SPECIFIC BURIAL OF UNFIXATED FLUE GAS SLUDGE,
Research-Cottrell, Inc., Bound Brook, NJ.
R. W. Goodwin.
Journal of the Environmental Engineering Division, Proceedings of ASCE, Vol 103, No EE6, p 1105-1114, December, 1977. 2 fig, 4 tab, 14 ref.

Descriptors: *Leaching, *Sludge disposal, *Path of pollutants, *Thermal power plants, *Landfills, Pollutant identification, On-site data collections, Industrial wastes, Environmental effects, Soil contamination, Aquifers, Waste water disposal, Waste water treatment, Costs.

The sludge resulting from flue gas desulfurization generally contains solid calcium salts and a variety of trace elements. A pilot-scale flue gas desulfurization (FGD) plant was operated at a 436 MW lignite-fired power plant in North Dakota in a study to provide information on various methods of sludge disposal. The cost-effectiveness of fixated and nonfixated sludge disposal were compared; the environmental feasibility of land burial of nonfixated sludge was exmined. Laboratory analyses of the chemical and physical characteristics of FGD sludge revealed that the sludge contained calcium sulfite hemihydrate, quartz, and calcite, with a moisture content ranging 17.5-40.0% of the total wet weight. Chemical characteristics of the sludge supernatant and filtrate were compared with those of a lignite aquifer. Geological, stratigraphic, and pedological investigations were carried out at the proposed sludge disposal site. The laboratory and field data suggested that downward and laterial migration of ions from the unfixated sludge burial site would be minimal. The site was considered feasible in terms of general soil conditions, permeability, ion exchange capacity, and aquifer locations. (Schulz-FIRL)
W78-05555

VARIABLE THICKNESS TRANSIENT GROUNDWATER FLOW MODEL THEORY AND NUMERICAL IMPLEMENTATION,
Battelle Pacific Northwest Labs., Richland, WA.
For primary bibliographic entry see Field 2F.
W78-05584

CATCH BASIN PROCESSING APPARATUS,
LRS Research Ltd., Broomall, PA. (Assignee).
For primary bibliographic entry see Field 5G.
W78-05601

RECREATIONAL VESSEL WASTE POLLUTION,
Coast Guard, Washington, DC.
For primary bibliographic entry see Field 5D.
W78-05621

POLLUTION FROM DREDGING OPERATIONS,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W78-05673

TOTAL WASTE RECYCLE SYSTEM FOR WATER PURIFICATION PLANT USING ALUM AS PRIMARY COAGULANT,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5D.
W78-05674

HAZARDOUS MATERIALS WASTE DISPOSAL (A BIBLIOGRAPHY WITH ABSTRACTS).
National Technical Information Service, Springfield, VA.
Available from the National Technical Information Service, Springfield, VA 22161 as PS-770421, Price codes: N01 in paper copy, N01 in microfiche. Report No NTIS/PS-76/0333, May 1976, M.F. Smith, Ed. 157 p.

Descriptors: *Bibliographies, *Hazards, *Toxins, *Toxicity, *Disposal, *Waste disposal, Pesticides, Pesticide removal, Explosives, Chemicals, Chemical wastes, Industrial wastes, Chemical warfare, Chemical industry, Waste disposal wells, Pollution, Solid waste disposal, Water pollution, Water pollution control, *Hazardous materials disposal, Chemical industrial wastes, Chemical warfare wastes, Waste disposal sites, Management planning.

An updated bibliography and abstract guide contains 157 abstracts, 65 of which are new entries to the previous edition (NTIS/PS-75/285). Topics include disposal of pesticides, explosives, chemical warfare agents, dangerous industrial chemicals, and other types of hazardous materials. Citations include research on management planning, disposal, pollution, toxicity, and National Disposal Sites. Radioactive wastes are not included. (Seip-IPA)
W78-05675

PROCEEDINGS OF THE NATIONAL CONFERENCE ON SOLID WASTES MANAGEMENT, HELD AT UNIVERSITY OF CALIFORNIA, ON APRIL 4 AND 5, 1966.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5D.
W78-05685

DEVELOPMENTS AT EIGHTH INTERNATIONAL CONFERENCE ON WATER POLLUTION RESEARCH.
Environmental Protection Agency, Washington, DC. Office of Research and Development.
Report No EPA-600/9-77-015, Conference Report, Sydney, Australia, October 17-22, 1976. February, 1977. 211 p, 4 fig, 1 tab, 16 ref, 4 append. R-804288010.

Descriptors: *Conferences, Water pollution, *Australia, *Water pollution treatment, *Water pollution control, *Water pollution sources, Pollutant identification, *International Association on Water Pollution Research, *Sydney(AUS).

Seventy-two pages, presented at the International Association of Water Pollution Researchers (IAWPR) Conference, are reviewed, discussed, and critiqued; their significance and value are assessed by participants in the Conference. Papers were presented in discussion sessions according to the following themes: (1) general, (2) spray irrigation with wastewater and virus removal, (3) lakes, reservoirs, and surface water quality, (4) groundwater pollution, (5) chorination, flocculation, and adsorption, (6) coastal pollution, (7) dynamics of biological nitrification, (8) ultimate disposal of sludges; (9) sludge thickening and dewatering, (10) pyrolysis of sewage sludge and refuse, (11) sludge thickening, (12) aeration ponds, (13) advanced waste treatment and physicochemical treatment of wastewaters, (14) stabilization ponds, (15) sulfide attack on sewers, (16) automation and aerobic and anaerobic digestion, (17) industrial wastewater management, (18) monitoring of waste discharges, (19) water resources quality management, (20) toxicity of industrial wastes, (21) stream oxygen balance and bioassays, (22) land treatment, (23) removal of organics and tertiary wastewater, (24) ion exchange, (25) fixed film biological contractors, and (26) uptake, exchange kinetics, and transport. An overview of pertinent informal and formal conference developments is presented. (Seip-IPA)
W78-05686

MODEL STUDIES OF OUTFALL SYSTEMS FOR DESALINATION PLANTS. PART I, FLUME STUDY OF THE MIXING CHARACTERISTICS OF DENSE JETS DISCHARGED INTO A FLOWING FLUID, VOL I, MAIN TEXT. APPENDIX A: NOTATION. APPENDIX B: CONDUCTIVITY PROBE CALIBRATION AND DATA REDUCTION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5B.
W78-05689

MODEL STUDIES OF OUTFALL SYSTEMS FOR DESALINATION PLANTS, PART II. TESTS OF EFFLUENT DISPERSION IN SELECTED ESTUARY MODELS, VOLUME I. MAIN TEXT,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5B.
W78-05690

5F. Water Treatment and Quality Alteration

WATER-PURIFYING APPARATUS,
Sachs-Systemtechnik G.m.b.H., Schweinfurt (West Germany).
V. Eibl, and A. Reis.
U.S. Patent No. 4,048,044, 4 p, 1 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 962, No 2, p 741, September 13, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, *Water quality control, Disinfection, Electrolysis, Electrochemistry, Anodes, Cathods, Oxidation, Silver anodes.

The invention relates to improvements in an apparatus for purifying water contaminated with microorganisms. The apparatus is constituted by an electrolytic cell comprising a silver-containing anode and a cathode, and the water to be purified flows substantially parallel to the anode and cathode surfaces through a space between them. The anode may be of a material containing metallic silver or of substantially pure (99%) silver. The apparatus of this invention avoids the need for disinfective additives whose exact amounts are often difficult to determine and which are frequently inadmissible for the consumption of the water. The water is not only disinfected but also decontaminated and detoxicated, bacteriological contaminations being converted into non-toxic compounds. These objects are accomplished by this invention and water purification may be substantially completed during the passage of the water through the cell. (Sinha - OEIS)
W78-05224

WATER FILTRATION MODULE,
L. Obidniak.
U.S. Patent No. 4,049,550, 6 p, 6 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 962, No 3, p 1237, September 20, 1977.

Descriptors: *Patents, *Water treatment, *Water pollution treatment, *Water purification, Filtra-

tion, Membrane processes, Reverse osmosis, Equipment, Domestic water, Ultra-filtration.

A water filter unit particularly adapted for filtration of small quantities of raw water as required in homes and the like is described. The unit includes a molded rigid plastic base and hinged cover which is mounted on a filter module containing ultra-filtration or reverse osmosis membrane, a sterilization tank fitted to the base of the unit, and a quick water tap connector for attachment to the raw water tap which is generally equipped with a special adaptor to connect and release the connector. One flexible hose from the quick water tap connector supplies raw water to the top of the filter module and a second flexible hose connects the drain from the bottom of the filter back to the quick water tap connector, while a third flexible hose carries the filtered water from the bottom of the filter module for delivery of purified water as required. All three flexible hoses are contained within a flexible sleeve which is clipped to the base of the unit when the unit is not in service. When the apparatus is not in use, the quick water tap connector is lowered into the sterilization tank so that air is kept from entering the filter unit thus preventing drying out of the filter element and bacteria contamination. (Sinha-OEIS)
W78-05230

PROCESS FOR PURIFYING WATER,
Degremont, Rueil-Malmaison (France). (Assignee).
F. M. Fiessinger.
U.S. Patent No. 4,051,028, 4 p, 3 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 962, No 4, p1722, September 27, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, Water quality control, *Water pollution treatment, *Waste water treatment, Flocculation, Coagulation, Chemical precipitation, Separation techniques.

In a process for coagulating and flocculating water reagent used is prepared on site and injected directly into the water to be treated in proportion at it is formed. The object of the invention is a process for the purification of water containing dissolved and/or suspended material which comprises adding a polymeric aluminum hydroxide solution prepared by treating slowly and under vigorous agitation a solution containing up to 2.5 moles/liter of an aluminum salt with a solution containing an amount of an alkaline or alkaline-earth hydroxide such that in the resulting solution the molar ratio of hydroxide to aluminum is from 2.3 to 2.7 and the concentration of aluminum s from 0.025 to 0.40 mole liter. The process allows both organic and inorganic material in suspension in the water to be eliminated, and therefore the cloudiness and the oxidizable materials to be simultaneously eliminated, which makes it clean for use in drinking water. (Sinha-OEIS)
W78-05236

WATER DISTILLER,
R. McFee.
U.S. Patent No. 4,052,267, 12 p, 10 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 963, No 1, p 245, October 4, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, Water quality control, *Distillation, Condensation, Demineralization, Equipment, Domestic water.

The invention provides a water distiller comprising a housing, a heater and a cap. The housing is sized to define a raw water storage space and has a suitable inlet for the introduction of raw water as well as a suitable outlet for removing brine or unused water. The heater is placed in the housing for vaporizing the water in the raw water storage space. The cap which is removably mounted on the housing has a radiator as well as a fan. The raiotor is connected in communication with the raw storage space in order to receive a flow of vapor while the fan serves to blow air over the radiator to cool the radiator and thus condense the vapor to water. The cap also has an outlet connected to the radiator for dispensing the distilled water. (Sinha - OEIS)
W78-05241

SUBMERGED ENCLOSURES MAY HELP SINK PLANT PROBLEMS,
H. F. Instruments, Ltd., Bolton (Ontario).
For primary bibliographic entry see Field 5D.
W78-05333

THE USE OF MEMBRANE FILTERS TO PRODUCE BACTERIA-FREE WATER TO BE USED IN A SPF-LABORATORY, (IN GERMAN),
Schering A. G., Berlin (West Germany). Dept. fuer Tierzucht Haltung.
U. Zillmann, R. Nehls, and K. Schwartz.
Z Versuchstierkd 18(5/6), p 324-336, 1976.

Descriptors: *Bacteria, *Filters, Laboratory tests, *Membrane filters, Microbes, *Pathogens, Water pollution, Potable water, Water treatment, Waste water treatment, *Filtration.

Membrane filters were tested with the intention of producing bacteria free water to be used as drinking water for SPF (Specific Pathogen Free)-laboratory animals. Tests were run to determine the effectiveness and the clogging time of the filters when using demineralized water. It is possible to produce bacteria free water with the filtration systems used. It seems necessary to acidify the water additionally in order to reduce the growth of microbes within the filter system and to prevent a recontamination. The sterile filtration technique proved to be more economical than thermic sterilization in this case and was chosen for this reason.--Copyright 1977 Biological Abstracts, Inc.
W78-05335

CUTTING (WATER) CONSUMPTION BY 95 PERCENT BY RECYCLING,
For primary bibliographic entry see Field 3E.
W78-05445

HEALTH EFFECTS OF NITRATES IN WATER,
Hebrew Univ., Jerusalem (Israel). Environmental Health Lab.
For primary bibliographic entry see Field 5C.
W78-05543

TRANSLATION OF REPORTS ON SPECIAL PROBLEMS OF WATER TECHNOLOGY, VOLUME 9 - ADSORPTION.
Karlsruhe Univ., (West Germany). Dept. of Water Chemistry.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 359, Price codes: A20 in paper copy, A01 in microfiche. Report No EPA-600/9-76-030, December, 1976. Conference held in Karlsruhe, Federal Republic of Germany, 1975. Sontheimer, H., Ed. 454 p, 187 fig, 39 tab, 290 ref. Volume 9 of 9. ICC614.

Descriptors: *Adsorption, *Water treatment, *Potable water, *Filtration, *Activated carbon, Water purification, Water treatment, Conferences, Technology, Evaluation, Ozone, Ion exchange, Organic compounds, Performance, Translations, *Reactivation, Aluminum oxide, Engler-Bunte-Institute.

Translations of twenty-four papers on adsorption and reactivation as a water treatment unit process are presented. Topics include adsorption processes in drinking water treatment, properties and use of activated carbon in water treatment, practical experience in pretreatment and treatment of water, and test and evaluation methods for water treatment. Investigations of bacteria in activated carbon filtration treatment systems and products, the use of ozone and aluminum oxide for water purification, and the use of microporous ion exchangers for drinking water purification were reported. Because of the practical problems involved in adsorption processes for water treatment, some criteria were listed as important for the evaluation of activated carbon filters: (1) control of organic substances in effluent water as compared to influent water; (2) reserve capacities; (3) determination of presence of nonpolar organochloro compounds; and (4) performance parameters relating to taste, odor, heavy metals concentration, biological performance, and concentration of dissolved organics. It was concluded that the practical aspects of water treatment by adsorption must be considered with basic process data in order to achieve better results in drinking water treatment. (Wares-IPA)
W78-05544

DETECTION AND INACTIVATION OF ENTERIC VIRUSES IN WASTEWATER,
Hebrew Univ., Jerusalem (Israel). Environmental Health Lab.
For primary bibliographic entry see Field 5D.
W78-05548

METHOD AND APPARATUS INTEGRATING WATER TREATMENT AND ELECTRICAL POWER PRODUCTION,
M. R. Jeppson.
U.S. Patent No. 4,052,858, 20 p, 13 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 963, No 2, p 441, October 11, 1977.

Descriptors: *Patents, *Water conservation, *Water reuse, *Water utilization, *Steam, Water treatment, Impaired water use, Water cooling, Irrigation water, Reclaimed water, Geothermal studies, Equipment.

Practical and economically feasible methods and apparatus, which utilize steam energy for such operations as sterilization of fresh or sewage water, electrical power generation and the large scale pumping of water and includes systems which may combine two or more of these operations to transform former waste products into valuable commodities are described. The energy requirements for such systems may be derived from steam sources which have heretofore presented heat disposal problems such as the discharge from generating station turbines, or from sources formerly considered unusuable such as low energy or corrosive steam wells. In one embodiment of the invention, discharge steam from a power generating station is used to heat and sterilze contaminated sewage water which may then be used for agricultural irrigation or other purposes. In another embodiment, fresh city utility water is sterilized by a heat exchange with the discharge steam of electrical generation facilities thereby reducing or eliminating chlorination requirements while also eliminating the need for conventional condensation structures and cooling water at the power station. In another instance, geothermal steam is utilized to lift water, which may be waste water that is sterilized in the process, to an elevated reservoir from which it may be caused to operate hydroelectric generators before being utilized for crop irrigation or the like. The invention may take a variety of forms which all have in common the utilization of steam energy and may combine some or all of these operations in one facility. (Sinha-OEIS)
W78-05604

PROCESS FOR THE PURIFICATION OF WATER,
Battelle Memorial Inst. (Switzerland). (Assignee).
J. F. Courvoisier, J. Meylan, and J. P. Fournier.
U.S. Patent No. 4,053,368, 7 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 963, No 2, p 613, October 11, 1977.

Descriptors: *Patents, *Water treatment, *Desalination, *Desalination processes, *Water purification, Water quality control, Distillation, Evaporation, Solar radiation, Separation techniques, Desalination apparatus.

A process for the purification of water comprises a step-wise procedure for heating and evaporating water to be purified and then condensing the water thus evaporated. The water to be treated is held in the form of a sheet on a surface having the property of absorbing solar radiation by accumulating external energy. This sheet of water is covered by a layer of liquid material, permeable to solar radiation, immiscible with water and having a vapour pressure less than that of water. The assembly thus formed is submitted to irradiation by solar rays so as to increase the temperature of the water. At least a part of the water thus heated is removed, a part of the water thus removed is evaporated and at least a part of the water vapour thus formed is recovered in the liquid state. The components assuring the heating function by means of solar energy are thus separated from those which effect the distillation operation. This separation renders possible the utilization of a very economical form of pan in which is effected the heating by irradiation by solar rays. This pan not only requires reduced upkeep and is hardly sensitive to the influence of wind, sand dust etc, but enables the use of a refrigerant other than atmospheric air to cause the condensation of the water vapour, permits the surface of each condensation unit to be reduced considerably and the yield to be improved. (Sinha-OEIS)
W78-05607

WATER PURIFICATION METHOD AND APPARATUS,
Westinghouse Electric Corp., Pittsburgh, PA. (Assignee).
K. Moeglich, and G. L. Hodgetts.
U.S. Patent No. 4,053,378, 11 p, 14 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 963, No 2, p 615, October 11, 1977.

Descriptors: *Patents, *Water purification, *Water treatment, *Electrolysis, Electrodes, Electrochemistry, Alternating current, Agglomeration, Flow, Descaling.

If an aqueous solution containing solids to be agglomerated is passed between electrodes on a continuous basis in the presence of a fluidized bed of conductive particles, vastly improved agglomeration or flocculation of the solids results from the multiplicity of electrolytic cells presented in the collapsing field of alternating current. In addition by utilizing conductive particles which are substantially resistent to attrition, a mechanical scrubbing effect will be exerted upon the electrodes which will tend to keep the electrodes clean during continuous operation and thereby avoid frequent shut downs for descaling. The fluidized bed may be established in the cell of this invention with the process water alone, or with the process water augmented by a gas such as air injected into the vessel. Once a fluidized state has been established, the likelihood of bridging, short circuits and the like between the electrodes is eliminated. Increased turbulence then increases the efficiency of the process. (Sinha-OEIS)
W78-05608

DRINKING WATER SYSTEMS FOR THE TRAVELING PUBLIC: A STATUS REPORT.
Environmental Protection Agency, Washington, DC. Office of Water Supply.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 304, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA/430/9-73/009, November, 1973. 13 p, 5 fig, 6 ref.

Descriptors: *Water supply, *Water quality, *Potable water, *Public health, Safety, Sampling, United States, Reservoirs, Groundwater, Wells, Bacteria, Water treatment, Travel(Recreation), Surface water.

The quality of water available to the traveling public at small water systems throughout the United States was assessed through study of selected water supply systems. Pilot studies assessed water quality, construction, maintenance, and operation of 233 systems, at public reservoirs, along interstate highways, and in state and national recreational sites. The majority used wells or springs (ground water) as a water source, and approximately 20% used lakes or rivers (surface water); only a few systems purchased treated water from nearby municipal systems. Of the ground water systems, 87 percent provided no treatment, despite the frequent lack of a good historical record of bacteriological quality. While nearly all surface systems provided treatment, one-third relied only on disinfection without clarification. Sixty-seven percent of those studied did not meet at least one recommended limit, and 24 percent distributed water that did not meet at least one mandatory chemical or bacteriological limit. Most frequent problems related to excessive levels of iron, maganese, and total dissolved solids; over 20% of the systems showed coliform contamination. Bacteriological surveillance varied widely, with only 10 percent sampled frequently enough to meet drinking water standards. Operation and control of the systems was generally poor, particularly at commercial water systems. Source protection throughout the studies was good, with 94 percent of the systems judged adequate. Higher priority on providing sanitary water supplies for travelers both by local and regulatory agencies is recommeded. (Wares-IPA)
W78-05623

DESIGN FOR CORROSION CONTROL OF POTABLE WATER DISTRIBUTION SYSTEMS,
Naval Civil Engineering Lab., Port Hueneme, CA.
For primary bibliographic entry see Field 8G.
W78-05624

STATISTICAL SUMMARY OF MUNICIPAL WATER FACILITIES COMMUNITIES OF 25,000 POPULATION AND OVER, AS OF JANUARY 1, 1960.
Public Health Service, Rockville, MD.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 753, Price codes: A04 in paper copy, A01 in microfiche. January 1960, 56 p.

Descriptors: *Water supply, *Water treatment, *Cities, *Municipal water, Water sources, Water storage, Water quality, Water purification, *Treatment facilities.

Tables summarize the information collected by the Public Health Service in the biennial inventory of water supply facilities in the country's larger cities. Tables 1 through 3 present data in terms of numbers of communities served, with the 1950 Census population of these communities. The rest of the tables pertain to water producing facilities. The data are grouped by community sizes according to 1950 Census data. All tables show data by population size groups and major drainage basins. A map showing drainage basins has been included. (Zayac-NC)
W78-05656

OZONE DISINFECTION AND OXIDATION IN A MODEL OZONE CONTACTING REACTOR,
Olin Corp., Brandenburg, KY.
For primary bibliographic entry see Field 5D.
W78-05670

DISINFECTION WITH QUARTERNACY AMMONIUM COMPOUNDS,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering; and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
L. K. Wang, and G. G. Rerry, III.
Water Resources Bulletin, American Water Resources Association, Vol 11, No 5, p 919-932, October, 1975. 4 fig, 7 tab, 28 ref.

Descriptors: *Disinfection, *Surfactant, *Water purification, *Chlorination, Coliforms, E coli, Water treatment, Chemical reactions, Waste water treatment, *Cationic surfactant, *Quaternary ammonium compounds, *Cetlydimethylbenzylammonium chloride(CDBAC), *Cetyltrimethylammonium bromide(CTAB), *Dialkyldimethylammonium chloride(DDAC), *Surface-active agent, *Disinfectant, Membrane filtration technique, Chemical process, Most probable number(MPU), Ozonation.

The nature, bactericidal properties, and potential field applications of three cationic surfactants, classified as quaternary ammonium compounds, (cetyltrimethyl-ammonium bromide (CTAB), ceyldimethylbenzylammonium chloride (CDBAC), and dialkyldimethylammonium chloride (DDAC) were tested to assess their effectiveness in replacing chlorine as water bactericidal agents. Administration of all three surfactants at over-dosages of 2.5-10.0 mg/l, at room temperature, at neutral pH, and at 10-minute contact time resulted in zero or near-zero coliform counts. CDBAC was more extensively tested and the afore mentioned parameters were varied. It was found that a dosage of 1.0 mg/l CDBAC was effective in destroying all coliform present (approximately 4500) in 100 ml of water within 10 minutes at neutral pH and at room temperature. The experimental effectiveness of cationic surfactants (specifically DCBAC) as recyclable bactericidal agents warrants thorough investigation of long-term effects on human health, and mechanism of surfactant disinfection, surfactant recovery technologies, and capital, overhead, and maintenance costs. (Seip-IPA)
W78-05677

5G. Water Quality Control

MNO2 DEPOSITION IN FEEDLOT WATER LINES IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W78-05202

PRODUCTIVITY AND NITROGEN BALANCE IN LARGE SCALE PHYTOPLANKTON CULTURES,
Woods Hole Oceanographic Institution, Woods Hole, MA.
For primary bibliographic entry see Field 5D.
W78-05205

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XIV. TRANSPORT.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05219

OIL AND WASTE WATER RECEPTION FACILITY AND PROCESS,
C. F. Propp.
U.S. Patent No. 4,048,070, 6 p, 4 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 962, No 2, p 750, September 13, 1977.

Descriptors: *Patents, *Waste water treatment, *Oil pollution, *Separation techniques, Water pollution treatment, Oily water, Water pollution control, Bilge water.

A system and process are employed that are particularly useful for receiving waste water from ships and for recovering the oil. The system utilizes an initial holding tank for the waste water, and this tank has an outlet for directing the water to one or more decantation tanks which may have heating means for cooking the waste water to increase the efficiency of oil and water separation. The decantation tanks are set at varying levels and are connected in series for concentrating the oil product to be collected. A lower portion of the tanks have outlet means leading to open top separator tanks. These separator tanks have pivotal skimming means and also have one or more baffles producing agitation of the water for further separating the oil. The separator tanks also have a partition over which water flows into a second tank portion from which the substantially oil free water is directed through a filter into an open top inspection tank. The pH of the effluent may be adjusted at the inspection tank. The inspection tank has an outlet for directing the substantially oil free water to disposal means such as a public sewer. The system employs manifold means for bypassing and recirculating if necessary. (Sinha - OEIS)
W78-05225

WATER POLISHING MEANS FOR REMOVING OIL AND OTHER FLOTSAM FROM WATER,
G. B. Stebbins, and J. F. Stebbins.
U.S. Patent No. 4,049,553, 8 p, 5 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 962, No 3, p 1238, September 20, 1977.

Descriptors: *Patents, Water quality control, *Water pollution treatment, *Oil pollution, *Separation techniques, Flotsam, Oily water, Skimming, Flow control.

The object of the invention is to provide a water polishing apparatus which is particularly suitable, effective and efficient for removing flotsam such as oil, paper fibers, wood particles, chopped vegetables and/or meat particles from water. The apparatus contains flow control means for controlling the flow of a mixture of flotsam and water in a manner which is highly effective to cause the flotsam and water to be separate and which includes skimming means associated or in combination with the flow control means which is effective to skim flotsam for the surface of the water as it rises to and accumulates on the surface of the water. (Sinha-OEIS)
W78-05231

OIL SPILL CLEANUP SYSTEM,
Shell Oil Co., Houston, TX. (Assignee).
R. R. Ayers.
U.S. Patent No. 4,049,554, 11 p, 14 fig, 15 ref; Official Gazette of the United States Patent Office, Vol 962, No 3, p 1238, September 20, 1977.

Descriptors: *Patents, *Oil pollution, *Water pollution control, *Water pollution treatment, *Oil spills, Skimming, Equipment, Separation techniques, Booms.

A skimmer for removing oil from the surface of a body of water is articulated from front to rear to be wave comformable and/or has a quiescent collection zone formed by bottom/or forward baffles.A flexible skimming head for use with or independently of the skimmer is composed of a foraminous sheet having an integral chevron flow pattern on its upper surface. An alternate floating skimmer head for use similar to the preceeding head has a central, axially vertically movable cone or other configuration forming a suction mouth. A boom for use with or independently of the skimmer is composed of converging double booms. Storage capacity for oil collected is provided by onboard and/or offboard membranes. (Sinha-OEIS)
W78-05232

OIL RECOVERY APPARATUS AND METHOD,
Lowe Engineering Co., Lincoln Park, NJ. (Assignee).
J. G. Lowe, and R. I. Butler.
U.S. Patent No. 4,051,024, 9 p, 7 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 962, No 4, p 1721, September 27, 1977.

Descriptors: *Patents, *Oil pollution, *Water pollution treatment, Water quality control, *Separation techniques, Equipment, *Oil recovery apparatus.

The oil recovery apparatus of this invention includes a simple frame upon which is mounted a motor which by a belt or chain drives a shaft on which is mounted a series of like disks. These disks are most efficient if they are made of a plastic which has a particular affinity for oil and petroleum products. Particularly effective in the pickup of oil has been polyethylene. The scrapers associated with the disks are ribbons of Nylon strips which are bent to provide scraping edges which are pressed against the sides of the rotating disks. In use the disks are rotated in a partly immersed condition and as they are rotated are sequentially lifted from the contaminated fluid and they are returned to an immersed condition. The scraped residue of oil removed just prior to reimmersion is fed to a conductor and then to an accumulator. The Nylon ribbons are of sufficient stiffness to provide the bias necessary to retain the bent ribbons in tight engagement with the sides of the disks to be scraped. They are readily removable and replaceable. (Sinha-OEIS)
W78-05235

FLOW CONTROL VANE FOR A SKIMMER-TYPE OIL BOOM,
National Marine Service, Inc., St. Louis, MO. (Assignee).
C. in't Veld.
U.S. Patent No. 4,051,038, 6 p, 8 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 962, No 4, p 1725, September 27, 1977.

Descriptors: *Patents, *Oil pollution, Water quality control, *Water pollution treatment, *Skimming, Flow control, Equipment.

This invention is based on the discovery that a floating weir suction-type oil skimmer operates more efficiently if the level of the water surface directly in front of the skimmer is relatively stable, particularly when the skimmer is subject to an oncoming surface current having appreciable velocity. The invention comprises a flow control vane element inclined in a forward direction with respect to an oncoming surface current, with the top edge of the web located slightly below the surface of the water. The flow control vane is particularly useful in connection with a skimmer of the floating weir type where a buoyant lip section floats just below the surface of the water to allow a thin surface layer to overflow the lip into a sump from which the liquid is continuously removed by suction. With such a skimmer, the oil floating on the surface of the water can be removed with a minimum of underlying water being removed and processed in a separator unit. (Sinha-OEIS)
W78-05239

OIL SWEEP,
Minnesota Mining and Mfg. Co., St. Paul.
M. G. Schwartz, A. P. Lorentzen, and D. J. Bucheck.
U.S. Patent No. 4,052,306, 6 p, 5 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 963, No 1, p 256-257, October 4, 1977.

Descriptors: *Patents, *Oil pollution, *Oil spills, *Water pollution treatment, Water quality control, Floating, Absorption, Barriers, Separation techniques, Containment(Oil spills).

A floatable oil sweep useful in controlling an oil spill on a moving body of water comprises an elongated web of oil sorbent adapted to float on the body of water with its large-area faces parallel to the waterline, and a weighted open-mesh netting attached to the web and adapted to be suspended below the floating web when the oil sweep is deployed. Use of the netting has been found to significantly extend the period of time before oil droplets are carried under the oil sweep by movement of the body of water. (Sinha - OEIS)
W78-05243

HYGENIC ASSESSMENT OF THE THERMAL DECOMPOSITION OF THE ACRYLATES PRODUCTION WASTES,
For primary bibliographic entry see Field 5D.
W78-05275

ALONG THE WATER CLEANUP ROAD.
Environmental Science and Technology, Vol 11, No 13, p 1150-1152, December, 1977.

Descriptors: *Chemical wastes, *Municipal wastes, *Activated sludge, *Sewerage, Biological treatment, Sewage treatment, Equipment, Industrial wastes, Waste water disposal, Waste water treatment.

As of July 1, 1977, approximately 3400 of 4000 industrial plants were in compliance with 'best practical' waste treatment requirements. Pretreatment of industrial wastes discharged to sewers is being required more often. One new technology uses specially developed bacterial strains to degrade lubricating and vegetable oils, animal fats, and greases. An activated carbon-activated sludge process is being used to treat effluent containing acids, heavy metals, organic dyes, and background solids and salts at the Du Pont Chambers Works at Deepwater, New Jersey. Techniques being studied for sludge disposal include land disposal, fluidized-bed combustion, and co-pyrolysis with refuse. A vortex Clarifier is available from Bird Machine Company, Inc., of South Walpole, Massachusetts, for removing fine suspended solids rapidly. A rugged monitor for total organic carbon which is claimed to be free of dissolved solids problems is available from Envirotech/Dohrmann, Santa Clara, California. Possible new software includes computers to control and simulate treatment systems. (Snyder-FIRL)
W78-05276

MEETING 1983 EFFLUENT REQUIREMENTS.
Food Engineering, p 69-70, 73, July, 1977. 1 fig, 1 tab.

Descriptors: *Water quality standards, *Industrial wastes, *Food processing industry, *Waste water treatment, *Treatment facilities, Activated sludge, Costs, Design data, Waste water disposal.

The Hillshire Farm waste water treatment plant in Wisconsin, installed in 1973 at a cost of $350,000, is discussed as one company's solution to meeting the 1983 effluent requirements. This meat packing plant realized capital cost savings of up to $400,000 and yearly savings in operating costs of up to $40,000 by installing their own treatment system, rather than discharging into the local municipal sewer system. The present waste water treatment plant consists of a rotary screen for kill flow wastes, a lift station, dissolved-air flotation, complete-mix activated sludge, chlorine contact, and final detention in a pond filled with marsh vegetation. The slection criteria and design are described for each of the unit processes. (Baker-FIRL)
W78-05299

OMC-LINCOLN MEETS TOUGH DISCHARGE ORDINANCE.
Industrial Finishing, Vol. 54, No. 1, p 36-37, January, 1978.

Descriptors: *Oil wastes, *Chromium, *Cadmium, *Zinc, *Separation techniques, Treatment facilities, Industrial wastes, Nebraska, Waste water treatment, Waste water disposal.

Waste water treatment processes used by Cushman Division of Outboard Marine Corporation in Lincoln, Nebraska, are outlined. Wastes treated at the industrial plant include: cyanide from zinc and cadmium plating and treating; chromium from paint line rinse waters, paint booth washes, and paint hook striping tanks; and aqueous oil from washer operations. Local discharge limits are set at 0.5 mg/liter for chromium and cadmium, 1.0 mg/liter for zinc, and 2.0 mg/liter for cyanide. Waste water containing chromium is pumped from a sump to a reduction tank where the pH is reduced to 2 with sulfuric acid. Sodium metabisulfite is added to produce trivalent chromium. Lime is then used to raise the pH in the coagulation-neutralization tank to 8.5. Clear liquid is discharged to the sewer system and sludge is transported to a holding tank after the solution settles overnight. Strong and weak cyanide solutions are mixed in a mobile storage tank where they are chlorinated after removal to the treatment plant. Oil is skimmed from aqueous wastes in a holding tank and pit and pumped to a collection barrel. The pH of the water is adjusted in a treatment tank where the emulsion-breaking process is accelerated with calcium chloride additions. After stirring and settling, the discharged water contains approximately 2 ppm of oil. (Lisk-FIRL)
W78-05300

GUIDELINES ISSUED FOR METAL FINISHING EFFLUENTS.
Water and Pollution Control, Vol. 116, p 21, January, 1978.

Descriptors: *Water quality standards, *Water pollution control, *Metals, *Suspended solids, *Cadmium, *Chromium, Copper, Lead, Zinc, Nickel, Waste water disposal, Waste water treatment, Treatment facilities, Industrial wastes.

Metal finishing plant effluent guidelines have been adopted by Fisheries and Environment Canada for the control of plating wastes. The elimination of raw waste disposal was effected by maximum limits for metal plating wastes. The maximum allowable concentrations include: 30.0 mg/liter total suspended matter, 1.5 mg/liter cadmium, 1.0 mg/liter total chromium, 1.0 mg/liter copper, 1.5 mg/liter lead, 2.0 mg/liter zinc, and 2.0 mg/liter nickel. Permissible levels of oxidizable and total cyanide are 0.1 mg/liter and 3.0 mg/liter, respectively. The guidelines also established a pH range of 6.0-9.5 for discharged waste. An estimated 70% reduction in raw waste loading is expected by the metal and pH limits. The treatment before disposal of emulsion cleaners, chlorinated hydrocarbons, effluent treatment sludges, and other processing solutions is required by the guidelines and a resulting 20% waste load reducion is expected. The treatment of concentrated wastes by metal plating and finishing plants may cost from $15,000-100,000, according to a study by the Water Pollution Control Directorate. (Lisk-FIRL)
W78-05308

THE INTEGRATED STEELWORKS OF SOLMER AT FOS-SUR-MER.
Steel Times, Vol. 205, No. 10, p 1030, 1032, 1034-1036, 1038-1041, October, 1977. 15 fig, 3 tab.

Descriptors: *Steel, *Industrial plants, *Industrial wastes, *Water pollution control, *Design data, Industries, Metals, Waste water treatment.

The steelworks of SOLMER at Fos-sur-Mer in France are described in detail. Major topics considered in the paper include: the site, ore reception and stocking, sinter plant, the cokemaking plant, the blast furnaces, the LD steelworks, slabbing mill, the continuous strip mill, the soaking pits, the hot mill, the finishing facilities, metallurgical control of quality, materials handling and transport, pollution control, energy and other supply networks, information management and process control, and works safety service. In the area of water pollution control, sophisticated waste treatment plants have been installed to ensure that the amounts of suspended solids, hydrocarbons, various toxins, dissolved salts, and organic pollutants that might occur in effluent from various processes are removed to within the statutory limits. (Baker-FIRL)
W78-05312

POSSIBILITIES AND MEASURES TAKEN BY THE PULP INDUSTRY FOR THE PROTECTION OF THE ENVIRONMENT (MOEGLICHKEITEN UND MASSNAHMEN DER ZELLSTOFFINDUSTRIE IM INTERESSE DES UMWELTSCHUTZES).
Umweltschutz, Vol. 14, No. 12, p 304-310, 1977.

Descriptors: Pulp and paper industry, *Pulp wastes, Foreign countries, *Industrial wastes, *Water consumption, Water pollution control, Separation techniques, Bleaching wastes, Biological treatment, Chemical precipitation, Oxidation, Recycling, Water reuse, Waste water treatment, Waste water disposal.

A survey of environmental protection measures being used by pulp and paper mills in Austria is presented. Emphasis has been placed on the reduction of air and water pollution by technological improvements, closed cycle processes, and other measures which permit partial recovery of chemicals, rather than on the treatment of effluents. In sulfite pulping operations, the switch from the calcium disulfite to the magnesium disulfite process has led to the greater recovery of process chemicals. The amount of organic waste generated during pulp cooking has been reduced from 1,000-1,5000 kg/ton of pulp to 8-15 kg/ton. Black liquor is concentrated to 55% of its initial volume prior to incineration. Magnesia, sulfur dioxide, sodium carbonate, and sodium sulfate are recovered. Volatile organic substances and methanol, present in the vapor condensate generated during the concentration of sulfite liquors, are also vacuum-stripped and incinerated. Oxygen and hydrogen peroxide are being considered as alternatives to chlorine for bleaching operations. Bleaching waste waters have been treated experimentally by chemical precipitation in addition to biological treatment, catalytic oxidation, wet oxidation, reverse osmosis, activated carbon adsorption, wet incineration, gamma irradiation, and ion-exchange processes. (Takacs-FIRL)
W78-05318

PULP INDUSTRY AND PROTECTION OF SURFACE WATERS (ZELLSTOFF-INDUSTRIE UND GEWAESSERSCHUTZ),
H. Fleckseder.
Umweltschultz Vol 14, No 12, p 288-293, 1977. 4 fig, 1 tab.

Descriptors: *Recycling, Pulp and paper industry, *Water consumption, *Biochemical oxygen demand, Industrial wastes, Sulfite liquors, Toxicity, Water reuse, *Pulp wastes, Waste water treatment.

Various aspects of water pollution control for Austrian cellulose-manufacturing plants are discussed, including waste water characteristics, effects of pollutants on surface waters, waste water treatment methods. Information on the BOD, COD, total organic carbon, color intensity, and toxicity of sulfite-cellulose manufacturing effluents is presented. The production of alcohol and yeast from sugars in sulfite boiling wash waters and evaporation of volatile organics have been used to reduce the total organic load from pulp mills. Nine of eleven pulp mills operating without chemical recovery were responsible for the discharge of approximately 480-600 million lbs of BOD/day. Renovation of waste waters from the cellulose-manufacturing industry would involve straining, filtration, flotation, sedimentation, flocculation, adsorption, and biological treatment. (Tallert-FIRL)
W78-05323

EFFLUENT TREATMENT IN THE TEXTILE INDUSTRY,
Shirley Inst., Manchester (England).
G. J. Parish.
Review of Progress in Coloration and Related Topics, Vol. 7, p 55-69, 1976. 105 ref.

Descriptors: *Textiles, *Biochemical oxygen demand, *Chemical oxygen demand, Legislation, Analytical techniques, Operations, Biodegradation, Toxicity, Sampling, Biological treatment, Adsorption, Filtration, Activated carbon, Oxidation, Recycling, Waste water treatment, *Industrial wastes.

Pollution control legislation, standard testing and analytical procedures, sampling methods, and treatment processes are reviewed for textile industry effluent. Pollution regulatory responsibilities in England have been given to the 10 Regional Water Authorities created by the 1974 Control of Pollution Act. Advancements in the development of analytical techniques, such as pH, flow, and oxygen concentration monitoring devices, and operational procedures for analyzing biodegradability were evaluated. Alternatives to the BOD test, such as COD, total organic carbon, total oxygen demand, and permanganate and dichromate values, were examined. Alternative treatment methods beyond the range of the conventional biological treatment of textile wastes were proposed. These included: physical separation through screening, sedimentation, flotation, and filtration; adsorption on activated carbon and ion exchange resins; oxidation with ozone or chlorine; membrane processes; and methods of color removal. The recycling of waste water from the textile industry is considered possible with flocculation, filtration, and adsorption or filtration with reverse osmosis. Tubular and plate heat exchangers are suggested for the recovery of up to 75% of the heat used in the manufacture of textiles and discharged in the textile mill effluent. (Lisk-FIRL)
W78-05327

TREATMENT PLANT AT REDBOURN.
Water and Waste Treatment, Vol. 20, No. 11, p 18, November, 1977.

Descriptors: *Industrial wastes, *Toxins, *Waste water treatment, *Treatment facilities, *Waste water disposal, Municipal wastes, Environmental sanitation, Sanitary engineering, Waste treatment.

An industrial waste treatment plant that was initially rejected by the District Council of St. Albans, England, has been approved with certain technical modifications. A plant will be built on a little more than five acres in an abandoned chalk quarry in Redbourn, England, to treat toxic and non-toxic wastes produced by Contract Gully Cleansing Limited. An appeal to the Secretary of State for the Environment to override the first decision to the St. Albans Council was denied due to the failure of planning conditions to meet certain technical safety requirements. These conditions were modified and the second application for the waste treatment facility was approved with provisions for screening foliage to be planted and suitable access routes to be constructed. The treatment plant will be conveniently located to provide

service for London and other areas without comprehensive facilities. (Lisk-FIRL)
W78-05331

TREATMENT OF WASTE WATER FOR EUTROPHICATION CONTROL (SANGYO HAISUI NO FUEIYOKASEIBUN NO SHORI NI KANSURU KENKYU),
Fermentation Research Inst., Tokyo (Japan) Div. of Microbe Engineering.
For primary bibliographic entry see Field 5D.
W78-05342

CHOOSING AN APPROPRIATE WATER TREATMENT,
Agency for International Development, Manilla (Phillipines).
R. A. Luken, and Y. Unkulvasapaul.
Environmental Science and Technology, Vol. 11, No. 13, p 1156-1159, 1977. 5 tab.

Descriptors: *Aerated lagoons, *Settling basins, *Activated sludge, *Cost comparisons, *Separation techniques, Industrial wastes, Waste water treatment, Waste water disposal, Sludge disposal, Treatment facilities.

Cost-effective waste treatment alternatives available to the tapioca s tarch industry for compliance with proposed effluent standards in Thailand were reviewed. Starch plants were categorized according to production size: first-grade starch with a daily capacity of 40-120 tons; second-grade starch with a capacity of 3-9 tons/day; and second-grade strach with a capacity of less than 3 tons/day. Two sets of effluents standards have been proposed, referred to as 1977 and 1979; it was recommended that Thailand adopt both standards for the first-grade starch plants. The more restrictive 1979 standards were not recommended for the second-grade plants because of the plants' economic instability and questionable future viability. The four waste water treatment methods examined are secondary to a primary classification pond treatment. The first process reviewed, a facultative oxidative pond, was practical where inexpensive, large land areas were available. Aerated lagoons were more appropriate where land was limited and expensive. The third process was a rotating biological drum filter for areas with limited, costly lands. An activated sludge lagoon on limited, very expensive land was the fourth alternative considered. Economic and social consideration of the four processes indicated that aerated lagoons were the most practical and economic processes for the tapioca starch industry in Thailand. (Lisk-FIRL)
W78-05343

WORKSHOP PROCEEDINGS: RESEARCH NEEDS RELATED TO ACID MINE WATER.
West Virginia Univ., Morgantown. Water Research Inst.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 807, Price codes: A07 in paper copy, A01 in microfiche. Proceedings: Northeast Water Institute Directors, November 10-12, 1976, held in Morgantown, West Virginia. M.C.L. Akamatsu, Ed. 1977. 118, 2 fig, 6 tab, 73 ref. OWRT B-061-RI(3), 14-31-0001-3953.

Descriptors: *Acid mine water, *Acid mine drainage, *Mine drainage, *Mine wastes, *Planning, *Management, *Research and development, *Mining, *Methodology, *Treatment, *Waste water treatment, Biology, *Biological communities, *Chemical analysis, Balance of nature, Ecology, Oxidation, Control, Water pollution sources, Water quality, Water pollution, Environmental control, Water pollution control, Standards, Priorities, *Refuse treatment, Biological impact, *Effluent guidelines, *Effluent standards.

Acid mine water research was discussed in this workshop from five standpoints: planning and management, mining methodology, treatment, biological aspects, and physiochemical aspects. Research needs in each category are specified and prioritized; participant presentations are included. An overview of current research summarizes 16 active EPA Technology Branch projects which address specific aspects of acid water control. (Seip-IPA)
W78-05345

PESTICIDES IN IOWA SURFACE WATERS: SUMMARY OF A WORKSHOP HELD MARCH 1977.
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 5B.
W78-05349

NON-POINT SOURCES OF WATER POLLUTION.
Oregon State Univ., Corvallis. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W78-05352

MINUTES - IOWA STATE WATER RESOURCES RESEARCH INSTITUTE ADVISORY BOARD AND COUNCIL TENTH ANNUAL MEETING.
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 6B.
W78-05353

COMMUNITY RESPONSE STRATEGIES FOR ENVIRONMENTAL PROBLEMS OF WATER SUPPLY AND WASTEWATER DISPOSAL IN FAIRBANKS, ALASKA,
Alaska University, College. Inst. of Water Resources.
D. W. Smith, and R. W. Pearson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 030, Price codes: A03 in paper copy, A01 in microfiche. IWR Report No. 66, June, 1975. 28 p, 3 fig, 1 tab, 39 ref. OWRT A-048-ALAS(1).

Descriptors: *Water supply, *Water demand, Water supply development, *Sewage treatment, *Waste water treatment, *Water resources development, Water quality control, Planning, Management, Economic impact, Alaska, Water quality standards, Fairbanks(Alas), 'Boom' economy.

The history of the response strategies of the Fairbanks, Alaska, community to problems of water supply and wastewater disposal is examined; long-term problems which have been altered or modified, but not solved, by past strategies are discussed. Community water supply and sewage systems have lagged behind population and area growth. Planning for water and sewage systems has been hindered by rapid and largely unanticipated economic 'boom' periods and by pressure exerted on limited community services by World War II, by the Korean War, and by Alaskan oil pipeline construction. The Fairbanks area and its water and sewage systems developed in a dispersed and fragmented settlement pattern, causing high per capita treatment and supply costs. Special sewage and water system design and building considerations are required because of the severe subarctic climate. Near-crisis environmental quality conditions existed until state and federal actions were initiated in the late 1960's. It is suggested that environmental quality/health laws should not be waived or ignored for 'national emergencies' or for other reasons, e.g., the anticipated economic booms associated with mineral explorations. Small settlements with poor wastewater treatment facilities could, if expanded rapidly, present serious health problems. (Seip-IPA)
W78-05357

ABATEMENT OF MALODORS AT CONFINED DREDGED MATERIAL DISPOSAL SITES,
Argonne National Lab., IL.; and Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W78-05360

HYDRODYNAMICS OF BUBBLE PLUMES AND OXYGEN ABSORPTION IN STRATIFIED IMPOUNDMENTS,
College of Petroleum and Minerals, Dharan (Saudi Arabia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-05371

SEDIMENTATION OF DISPERSED OIL IN SURFACE WATERS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. of Aquatic Sciences.
For primary bibliographic entry see Field 5B.
W78-05373

PILOT PLANT INVESTIGATION OF THE EVOLUTION OF VARIOUS POLLUTANTS DURING ARTIFICIAL RECHARGE OF AN AQUIFER BY A BASIN,
Societe Lyonnaise des Eaux et de l'Eclairage (France).
For primary bibliographic entry see Field 5B.
W78-05374

THE APPLICATION OF A TWO-LAYER TIME-DEPENDENT MODEL TO POLLUTION ASSESSMENT AND CONTROL IN A SHORT STRATIFIED ESTUARY,
Sydney Univ. (Australia). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W78-05375

NATURAL LAKE WATER TEMPERATURES IN THE NEARSHORE WATERS OF SOUTHEASTERN LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 2H.
W78-05391

SOLID WASTE MANAGEMENT PLAN, (LEHIGH-NORTHAMPTON COUNTIES JOINT PLANNING COMMISSION).
Weston (Roy F.) Inc., West Chester, PA.
Prepared for Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA, August 1971. 245 p, 190 tab, 18, 3 append, 18 plates.

Descriptors: *Solid wastes, *Management, *Waste disposal, Landfills, Administration, Municipal wastes, Regional analysis, *Pennsylvania, Waste water treatment, *Lehigh County(PA), Northampton County(PA).

The Plan deals with the generation, storage, collection, transportation, processing and disposal of solid wastes. The study area for the Plan consists of Lehigh and Northampton Counties, containing 62 municipalities and with a 1970 population of 469,672. Study objectives included delineation of waste management systems, the provision of those systems in accordance with air and water pollution and public nuisance ordinances, projection of a time schedule and cost estimates for the implementation of the systems, and provisions for periodic review. Existing solid waste generation practices and management systems were summarized. These data then provided the base for solid waste projections, a discussion of the applicability of available technology and determination of proposed transfer and disposal facilities. Recommendations included: solid waste be transferred by the collection vehicle in most areas; the

delineation of refuse areas for 1975-1980, 1980-1985 and 1985-1990; that solid waste be disposed of by sanitary landfill, the sites of which should be limited in number by each serving a number of municipalities; and the establishment of either a Bi-County Solid Waste Authority or one Authority for each county to implement the plan and to maintain an overview of state and local developments. (Zayac-NC)
W78-05395

SOLID WASTE MANAGEMENT PLAN-1977 SUPPLEMENT (LEHIGH-NORTHAMPTON JOINT PLANNING COMMISSION),
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
T. D. Keene, and A. R. O'Dell.
Annual supplement to the JPC Solid Waste Management Plan (August 1971). 44 p, 2 maps, 1 chart. 03-00-1092-14.

Descriptors: *Solid waste, *Waste disposal, *Management, Administration, Municipal wastes, Landfills, *Pennsylvania, Lehigh County(PA), Northampton County(PA), Resource recovery projects.

This report contains a reevaluation of some of the major goals outlined in the 1971 regional solid waste management plan. It includes a status report and an analysis of landfills and other solid waste disposal activities in the region. Solid waste generation estimates and projections from the 1971 plan are analyzed, and the new Federal Resource Conservation and Recovery Act of 1976 is briefly summarized and analyzed. An extensive status report of some of the major resource recovery demonstration projects is presented. Finally, findings and recommendations based on the data collected are presented, the major recommendation being that solid wastes continue to be disposed of by sanitary landfill until resource recovery can begin to compete on a cost basis and can be implemented with a good degree of reliability. (Zayac-NC)
W78-05396

REGIONAL STORM DRAINAGE PLAN, (LEHIGH-NORTHAMPTON JOINT PLANNING COMMISSION).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
For primary bibliographic entry see Field 6F.
W78-05397

REGIONAL STORM DRAINAGE PLAN-1977 SUPPLEMENT, (LEHIGH-NORTHAMPTON JOINT PLANNING COMMISSION),
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
For primary bibliographic entry see Field 6F.
W78-05398

ALTERNATIVES TO THE MANAGEMENT OF HAZARDOUS WASTES AT NATIONAL DISPOSAL SITES. VOLUME II. APPENDICES.
Little (Arthur D.) Inc., Cambridge, MA.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-237 264, Price codes: A11 in paper copy, A01 in microfiche. Report EPA/530/SW-46c.1, Prepared for Office of Solid Waste Management Programs, Environmental Protection Agency, Washington, D.C., 1973. 235 p, 54 tab, 29 fig.

Descriptors: *Hazards, Wastes, *Waste disposal, *Management, *Planning, Waste treatment, Waste storage, Organic wastes, Radioactive wastes, Explosives, Water pollution, Institutional constraints, Legal aspects, Safety, Risks, Economic justification, Inorganic wastes, Off-site treatment, Pretreatment, Risk analysis, Hazardous wastes.

The hazardous wastes with which this study is concerned include organic wastes, inorganic wastes, explosive wastes, and radioactive wastes. The various alternatives for managing hazardous wastes are defined and evaluated on technical, economic, legal, and risk grounds. The alternative approaches that are considered include: on-site processing; off-site processing; and on-site pretreatment with off-site treatment and disposal. The major emphasis of the study is the assessment of differences among these alternative approaches in the economics associated with waste treatment, the probability of immediate risk to human safety, as compared to other risks to which the population is exposed, the eventual water pollution hazard, and the legal and institutional issues on the Federal and state levels that would have an impact on a national treatment system. The major conclusion of this report is that on economic grounds alone, off-site treatment facilities will be preferred by a majority of producers of industrial hazardous wastes, with the possible exception of those who handle explosives and dilute aqueous wastes. Although the shape and form of the processing system may vary because of differing needs, this conclusion will be true for all regions of the United States. (Nessa-NC)
W78-05418

APPLICATION OF THERMAL IMAGERY AND AERIAL PHOTOGRAPHY TO HYDROLOGIC STUDIES OF KARST TERRANE IN MISSOURI,
Geological Survey, Rolla, MO. Water Resources Div.; and Missouri Dept. of Natural Resources, Rolla. Div. of Geology and Land Survey.
E. J. Harvey, J. H. Williams, and T. R. Dinkel.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-275 816, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 77-16, September 1977. 58 p, 26 fig, 5 tab, 12 ref.

Descriptors: *Waste disposal, *Surveys, *Remote sensing, *Karst hydrology, *Missouri, Aerial photography, Infrared radiation, Evaluation, Green and Reynolds Counties(Mo), Salem Plateau, Springfield Plateau, Karst terrane.

Planning waste-disposal facilities and impoundments is complicated by karst carbonate terrane in the Ozarks. Thermal imagery (8-13 micrometer wavelength) and color infrared photography aid in identifying losing streams, sinkholes and hydrologic conditions encouraging collapse. Imagery and photography were acquired in Greene and Reynolds Counties, Mo., in March 1972 and June 1973. Differences in thermal levels correlating with losing and gaining reaches of Logan Creek Valley, Reynolds County, were not visually apparent in predawn March imagery but statistical analysis of predawn magnetic-tape data indicated greater variance in emitted energy from the losing reach than from the gaining reach. In June, the gaining reach of Logan Creek was darker (cooler) on thermal imagery than the lighter (warmer) losing reach at postsunset and predawn. Overflights between May and June 1973, using a raidometer strengthened the visual interpretation of the imagery. Spring and autumn are poor times to collect thermal data for this purpose while midday in later summer may be a very good time. (Woodard-USGS)
W78-05441

PRACTICAL EXAMPLES OF SPECIAL POSSIBILITIES FOR REDUCING EFFLUENT LOADS IN PAPER MILLS (PRAKTISCHE BEISPIELE FUER SPEZIELLE MOEGLICHKEITEN ZUR ABWASSERENTLASTUNG IN PAPIER-FABRIKEN).
Erbsloeh and Co., Geisenheim (West Germany).
For primary bibliographic entry see Field 5D.
W78-05462

NEKOOSA (PAPERS INC.) CLEANS CONDENSATES WITH STEAM DISTILLATION.
Chemetics International Ltd., Vancouver (British Columbia).
For primary bibliographic entry see Field 5D.
W78-05465

ENVIRONMENTAL DESIGN PARAMETERS FOR A MODERN SULFITE MILL,
Fraser Companies Ltd., Edmundston (New Brunswick).
For primary bibliographic entry see Field 5D.
W78-05470

WATER RESEARCH: SOLVING COLORADO'S WATER PROBLEMS,
Colorado State Univ Fort Collins. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W78-05481

DEVELOPMENT OF PROCEDURES FOR COST-SHARING AND REPAYMENT ANALYSIS,
New York State Coll. of Agriculture and Life Sciences, Ithaca.
For primary bibliographic entry see Field 6B.
W78-05485

HEAVY METAL ENRICHMENT IN MINE DRAINAGE: IV. THE ORANGE FREE STATE GOLDFIELD,
Pretoria Univ., (South Africa). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W78-05491

POSSIBILITIES FOR ECONOMIC RECOVERY OF METALS FROM MINE DRAINAGE AND TAILINGS IN THE FRONT RANGE, COLORADO,
Colorado School of Mines, Golden. Dept. of Chemistry; and Colorado School of Mines, Golden. Dept. of Geochemistry.
R. W. Klusman, and E. B. Nelson.
The Mines Magazine, Vol 67, No 10, p 15-30, December, 1977. 2 fig, 2 tab, 16 ref.

Descriptors: *Mine wastes, *Leaching, *Metals, *Reclamation, *Mine drainage, Spoil banks, Iron, Chemical precipitation, Neutralization, Industrial wastes, Waste water treatment, Recycling, Costs.

Tailings from the Nevada Gulch area in the Central City mining district of Colorado were used in a series of experiments on leachates and their possible environmental effects. The possibility of the presence of a considerable quantity of precious metal in the area's mine tailings led to a study on the recovery of metal values to offset costs of leachate treatment. Leaching experiments with indoor vertical tubes and outdoor wooden boxes were used to examine the leaching behavior of Fe, Cu, Zn, Mn, Cd, Pb, As, Ag, Au, and S04 with respect to leaching solution, grain size, and residence times. Concentrations of heavy metals were higher in leachates from tailings having smaller grain sizes and in those which had been produced with acidic solutions. Heavy metal concentrations were decreased by the presence of Fe(OH)3 which absorbed some of the dissolved species. A two-stage treatment scheme with neutralization pH 4.0, followed by further pH adjustment to pH 9.0, has been suggested as an environmentally sound method of leaching metals from mine tailings. Recommendations for further study in the Colorado mining district include a survey of the tonnage and composition of the area's mine tailings, a pilot study of the two-stage treatment process, and a survey of the area's uranium deposits. (Schulz-FIRL)
W78-05507

EARLY PLANT SUCCESSION ON A DREDGING SPOILS ISLAND IN THE SENECA RIVER OF UPSTATE NEW YORK,
Eisenhower Coll., Seneca Falls, NY. Div. of Science and Mathematics.
G. L. Miller.
Bulletin of the Torrey Botanical Club, Vol. 104, No. 4, p 386-391, October-December, 1977. 1 fig, 3 tab, 13 ref.

Descriptors: *Succession, *Cottonwoods, Invasion, Wetlands, Plant populations, *New York, Willow trees, *Dredging spoils islands, *Moisture gradient, Goldenrod, Purple loosestrife, Scirpus validus, *Seneca River(NY).

Early plant succession on dredged lake bottom spoils was studied during the first two years following exposure. Species invasion during the first year was dominated by eastern cottonwood. The second year Scirpus validus dominated; eastern cottonwood was second in importance. The coefficient of community similarity for the first two years was 61%. Two distinct moisture gradient species assemblages developed: (1) Populus-Salix-Salidago occurred on the drier sites, (2) Scirpus-Lythrum-Verbena on wetter sites. Drier sites exhibited twice the diversity of the wetter sites. Fifty-eight species were identified during this investigation. Successful species invasion is directly related to seed dispersal mechanisms, with wind dispersed forms being the most common. (Stihler-Mass)
W78-05523

TRANSPLANTATION OF TYPA AND THE DISTRIBUTION OF VEGETATION AND ALGAE IN A RECLAIMED ESTUARINE MARSH,
Boyce Thompson Inst. for Plant Research, Yonkers, NY.
For primary bibliographic entry see Field 2H.
W78-05526

MODERN WAYS OF STRIP MINING IN MOUNTAINOUS AREAS,
Environmental Protection Agency, Cincinnati, OH.
E. C. Grim.
News of Environmental Research in Cincinnati, Industrial Waste Treatment Research, June 13, 1975. 4 p, 6 fig.

Descriptors: *Strip mines, *Strip mine wastes, *Reclamation, *Environmental effects, *Environmental control, Coal mines, *Coal mine wastes, Overburden, Spoil banks, Mining engineering, *Head-of-hollow strip mining, *Mountain-top removal strip mining, *Block-cut strip mining, *Contour strip mining, *Area strip mining, Surface mining.

Conventional methods of area and contour strip mining are briefly described; associated environmental and reclamation problems are discussed. Three new methods of contour mining which minimize adverse environmental damage are presented. The 'head-of-hollow fill' method provides storage space for spoil generated from mountainous mining operations and a waste area for overburden from contour benches. Spoil is used to fill hollows near the ridge top. The filled area is terraced and covered with topsoil; a stable useable erosion-resistant area results. 'Mountain-top removal' method is used to recover coal from seams lying near tops of mountains, ridges, knobs, or knolls. The mountain top is reduced by a series of cuts parallel to the ridge line. Overburden from each cut is used to fill the previously excavated cut or is transported to a storage area; none is pushed over the downslope. The mountain top is covered with a 20- to 40-foot layer of spoil, graded flat, and top-soiled. A large plateau of level, rolling land results. The 'block-cut' method is an operational adaption of conventional contour steep-slope mining. A large initial cut is made into the mountain; first-cut spoil is deposited above the highwall or in a head-of-hollow fill. Overburden from succeeding cuts is used to fill the previous cut as mining and concurrent reclamation progress around the mountain in both directions. No spoil is deposited downslope; topsoil is saved and used in reclamation. Diagrams of each method are presented. A comprehensive environmental assessment of all three methods is mandated. (Seip-IPA)
W78-05530

ONSITE CONTROL OF SEDIMENTATION UTILIZING THE MODIFIED BLOCK-CUT METHOD OF SURFACE MINING.
Kentucky Dept. of Natural Resources and Environmental Protection, Frankfort.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 244, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-600/7-77-068, July 1977. 91 p, 29 fig, 16 tab, 34 ref, 2 append. EHE 623, 802681.

Descriptors: *Mining, Sedimentation, Surface runoff, Surface waters, Mining engineering, *Sediment control, Kentucky, Economics, Environmental effects, *Water pollution control, Pollution abatement, *Block-cut method, *Surface mining.

A detailed site survey, subsurface investigation, and the development of preliminary plans were part as a study at Lower Lick Fork in Perry and Letcher Counties, which was conducted to determine the feasibility of a demonstration project for onsite control of sedimentation utilizing the modified block-cut method of surface mining. Calculations indicate that the sediment yield from the mining operation will be within the water quality standards of the Commonwealth of Kentucky. All operations proposed in the demonstration project meet present State regulations for surface mining. A comparison of costs involved in the modified block-cut method of mining and in a method using the minimum acceptable requirements as set forth in the present regulations was prepared. The cost differential of the two method appears to be negligible. The demonstration should prove that the need for sediment basins with the modified block-cut method of mining should be minimized, or perhaps eliminated, according to State and Federal regulations. A water quality monitoring station was constructed to provide data before, during, and after the mining operation, for use in evaluating and documenting the efficiency of this method of mining in providing on-site control of sedimentation. The demonstration project plans should account for the economic and environmental interests of all concerned parties to the coal mining operations under study. (Wares-IPA)
W78-05536

DEVELOPMENT STATUS AND ENVIRONMENTAL HAZARDS OF SEVERAL CANDIDATE ADVANCED ENERGY SYSTEMS,
Lockheed Missiles and Space Co., Inc., Huntsville, AL. Huntsville Research and Engineering Center.
M. M. Penny, and S. V. Bourgeois.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 759, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-600/7-77-062, June 1977. 99 p, 18 fig, 8 tab, 43 ref. Task Order No. 8, 68-02-1331.

Descriptors: *Environmental effects, *Pollutants, *Energy, *Hazards, Assessments, Energy conversion, Electric power production, Electric power industry, Forecasting, Estimating, Ecology, *Energy resource development, Pollution control, Energy systems.

The development status of several advanced energy concepts is reviewed. Systems reviewed include potential new sources of energy and improved energy conversion (magnetohydrodynamics, hydrogen fuel cells, ocean thermal energy conversion, wind power, turbines, thermoelectric converters, thermionic converters, potassium vapor topping cycles, and electrogasdynamics). Estimates are made as to when each will begin to contribute significantly to U.S. energy needs. Appraisals were made of the environmental impact of each system, including assessment of the adequacy of pollution control technology and potential gross ecological impact. The overall conclusion is that each energy system has a ndegligible or mild direct environmental impact when compared with conventional fossil fuel and nuclear systems, but that indirect impacts for some of the energy systems could be severe and need further study to quantify their impact. Considering both the expected environmental impact and period of technology breakthrough/commercialization, the following order of research and development priorities on the candidate energy systems has been developed: high temperature turbines, ocean thermal gradients, windmills, magnetohydrodynamics, metal vapor (potassium) Rankine topping cycles, hydrogen fuel cells, thermionics, electrogasdynamics, and thermoelectric conversion. (Wares-IPA)
W78-05538

EXPERIMENTAL SIMULATION OF SINGLE AND MULTIPLE CELL COOLING TOWER PLUMES,
Corvalis Environmental Research Lab., OR.
For primary bibliographic entry see Field 5A.
W78-05539

A PRELIMINARY ASSESSMENT OF THE ENVIRONMENTAL IMPACTS FROM OIL SHALE DEVELOPMENTS,
TRW Environmental Engineering Div., Redondo Beach, CA.
K. W. Crawford, C. H. Prien, L. B. Baboolal, C. C. Shih, and A. A. Lee.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 283, Price codes: A09 in paper copy, A01 in microfiche. Report No. EPA-600/7-77-069, July 1977. 174 p, 25 fig, 39 tab, 158 ref. 68-02-1881.

Descriptors: *Oil shales, *Mining, *Waste disposal, Waste water(Pollution), Separation techniques, Air pollution, Colorado, Utah, Solid wastes, Environmental effects, Water pollution sources, Extraction, Retorts, Refining, Land disposal.

A summary is presented of major oil shale extraction and retorting development activities, including properties, sources, and quantities of wastes which may be generated by these technologies and activities, potential environmental impacts and hazards resulting from oil shale development, and pollution control technology and/or management practices that have been developed or are planned for commercial operations on private and Federal lease tracts in Colorado and Utah. Atmospheric emissions of oil shale development activities are expected to include sulfur dioxide, nitrous oxides, carbon monoxide, hydrocarbons, particulate matter, and some hazardous substances such as ammonia, hydrogen sulfide, silica, volatile organics, and metals. Waste waters from oil shale processing may contain high levels of dissolved and suspended solids with high chemical and biochemical oxygen demand, such as oil and grease, reduced nitrogen, sulfur compounds, phenolics, carboxylic acids, organic compounds, raw shale fines, shale coke, catalysts, lime and alum sludges, and activated carbon and diatomaceous earth. Major environmental impacts will occur relative to air quality, water quality and hydrology, and solid waste disposal. Ongoing environmental monitoring programs and studies related to oil shale development activities are also described in order to indicate the scope, quality, and availability of data on geotechnology and the environment. (Wares-IPA)
W78-05540

HANDBOOK OF PROCEDURES, CONSTRUCTION GRANTS PROGRAM FOR MUNICIPAL WASTEWATER TREATMENT WORKS.
Environmental Protection Agency, Washington, DC. Office of Water and Hazardous Materials.
For primary bibliographic entry see Field 5D.
W78-05546

THE STATUS OF THE EPA LABORATORY AUTOMATION PROJECT,
Environmental Monitoring and Support Lab., Cincinnati, OH. Physical and Chemical Methods Branch.
W. L. Budde, B. P. Almich, and J. M. Teuschler.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 174, Price codes: A03 in paper copy, A01 in microfiche. Report No EPA-600/4-77-025, April 1977. 31 p, 4 fig, 2 tab, 11 ref.

Descriptors: *Automation, Computers, *Laboratories, *Testing, *Laboratory tests, *Water analysis, Instrumentation, Laboratory equipment, Research facilities, Quality control, Data collections, *Laboratory automation, Computer hardware, Computer software.

The status of the Environmental Protection Agency's laboratory automation project is described in terms of currently installed systems and work in progress to develop and improve the system. The following are included: a management overview of the general goals, a management implementation plan, a review of the quality control aspects, summaries of work in progress during fiscal year 1977, an overview of the hardware and software operations of the instrument automation system, and an overall plan for the integration of instrument automation and laboratory data management systems. (Seip-IPA)
W78-05547

FORECASTING THE COMPOSITION AND WEIGHT OF HOUSEHOLD SOLID WASTES USING INPUT-OUTPUT TECHNIQUES--AN EXECUTIVE SUMMARY,
Ebon Research Systems, Washington, DC.
For primary bibliographic entry see Field 5B.
W78-05551

DESIGN UNDER STOCHASTIC GROUNDWATER FLUCTUATION,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 8E.
W78-05570

CATCH BASIN PROCESSING APPARATUS,
LRS Research Ltd., Broomall, PA. (Assignee).
L. P. Taylor, and A. Petroski.
U.S. Patent No. 4,040,960, 11 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 961, No 2, p 758, August 9, 1977.

Descriptors: *Patents, *Waste disposal, *Sludge disposal, Landfills, Water reuse, Equipment, Pumps, Monitoring, Sewage lagoons.

A mobile system for cleaning and processing catch basin and/or lagoon waste products is described where the degree of waste product dilution is carefully controlled prior to transmission to a mobile dewatering truck capable of producing a substantially dry land fill suitable end product and water suitable for recirculation or environmentally acceptable discharge to a process hear or sanitary sewer. Throughout the process, material which is collected from the catch basin (wash effluent or wash stream) is monitored qualitatively and quantitatively at numerous stages in the process. By monitoring the nature and quantity of this flow, the level of the equalization means, the density of the dewatering means input, the centrate turbidity centrate flow rate and centrate pH, various valves are automatically operated which regulate the bypass of the wash effluent back into the catch basin, the flow of material to the process head or ejector, rates of pumping means, dewatering means, etc. (Sinha-OEIS)
W78-05601

DREDGING SYSTEM AND METHODS OF DREDGING,
For primary bibliographic entry see Field 8C.
W78-05603

APPARATUS AND METHOD FOR RECOVERING OIL FROM ICY WATERS,
Artec, Inc., Columbia, MD. (Assignee).
P. C. Deslauriers, R. P. Voelker, E. J. Lecourt, and L. A. Schultz.
U.S. Patent No. 4,053,406, 11 p, 8 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 963, No 2, p 624, October 11, 1977.

Descriptors: *Patents, *Water pollution treatment, *Water quality control, *Oil pollution, Oil spills, Cold regions, Ice, Separation techniques, Equipment.

An acquatic vessel, preferably a barge which is either self- or non-self-propelled is equipped with ice curring, oil recovery and processing apparatus. The ice covered area that is polluted with oil is approached by the vessel and the oil-contaminated ice is cut into slabs which are conveyed to a cleaning station where high pressure air and/or water jets and/or chippers remove the oil and some of the exterior of the slab. The oil and ice mixture that is removed from the slab is collected and heated. The oil is separated and purified and used as fuel and/or stored. The cleaned ice slabs are dropped back in the channel behind the vessel. Oil that is located beneath the ice, not adhering to the ice slabs, travels down an inclined plane under the vessel, rises in a well, and is separated out and used as fuel or stored. The vessel can also be used to clear an area, such as a harbor, of ice and to transport the collected ice to a designated area, since it has the capabilities for loading, storing, and off-loading ice. The propulsion means for the barge may include Archimedes' screws for propelling the barge at slow speeds. (Sinha-OEIS)
W78-05609

SALT WATER INTRUSION IN THE UNITED STATES,
Robert S. Kerr Environmental Research Lab., Ada, OK.
For primary bibliographic entry see Field 5B.
W78-05613

FEASIBILITY OF SILVER-LEAD MINE WASTE MANIPULATION FOR MINE DRAINAGE CONTROL.
Montana Dept. of Natural Resources and Conservation, Helena. Engineering Bureau.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 599, Price codes: A06 in paper copy, A01 in microfiche. Report EPA-600/2-77-225, November 1977. 97 p, 33 fig, 30 tab, 15 ref, 7 append. S802122.

Descriptors: *Feasibility studies, *Mine drainage, *Water pollution control, *Acid mine water, Acid streams, Drainage, Drainage effects, Montana, Pollution abatement, Surface sealing, Surface drainage, Topography, Revegetation, Environmental effects, Mine wastes, Water quality, Water chemistry, Grading, Lead mine wastes, Silver mine wastes, Tailings, Surface treatment.

A feasibility study examined the acid mine drainage problems of the Dry Fork of Belt Creek in Montana and recommended abatement methods. The history of mining and acid mine drainage problems in the study area is reviewed and current mine drainage abatement measures being employed there are evaluated. Consideration is also given to the jurisdictional framework: local topography, hydrology, water quality, social and environmental factors, and elements influencing the value of acid mine drainage demonstration projects through which a mine drainage abatement project may be carried out. Mine dump surface regarding and sealing are recommended as the method of reducing the acidic wastes entering Galena Creek. The top of Block P Mine dump should be sloped so as to allow proper drainage, and the top should be sealed with a bentonite seal and top soil added to allow revegetation. The bypass pipeline around the Block P Mine dump should be extended to prevent water in Galena Creek from creating seeps in the toe of the dump. Silver and Green Creeks should be rechanneled around the smaller tailings piles to prevent surface runoff from entering the tailings material. The appendices contain formation on water quality samples, flow vs. concentration data for selected stations, concentration and load vs. time data for selected stations, daily streamflow records, climatological data, and the chemistry of acid mine drainage and its effect on streams. (Wares-IPA)
W78-05614

RECLAMATION OF SURFACE MINED COAL SPOILS,
Kentucky Agricultural Experiment Station, Lexington. Dept. of Agronomy.
R. I. Barnhisel.
Available from the National Technical Information Service, Springfield, VA 22161, as PB-272 678, Price codes: A04 in paper copy, A01 in microfiche. Report No. EPA-600/7-77-093, August 1977. 57 p, 15 tab, 19 ref. CSRS IAG No. D6-E762.

Descriptors: *Coal mine wastes, *Mine wastes, Ecology, Atmosphere, Environmental effects, Environmental engineering, Phosphorus, Revegetation, Reclamation, Chemistry, Rainfall, Forages, Spoil banks, Combustion, Refining, Surface mining.

Field experiments were established in western Kentucky on four types of surface-mined coal spoils to represent the extremes in spoil materials commonly encountered in reclamation. With the provision for retaining rainfall on the spoils by means of tillage, yields of mixed legume-fescue forage exceeded 4 metric tons per hectare (2 T/acre). These yields were equal to or greater than those of adjacent nonmined land. The advantage of a rough surface created by ripping or subsoiling was obtained at all levels of applied phosphorus. The use of a chisel plow or heavy-duty disk produced a rough microrelief that also produced significantly greater forage yields than obtained from smooth graded plots. It was found that phosphorus and water are more commonly the limiting factors in obtaining an adequate degree of vegetative cover and associated forage yield than the acidic nature of spoils; however, lime must be incorporated in acidic spoils to effectively improve growing conditions. Downward movement of lime should not be expected to occur at a rate sufficiently high to improve the growing conditions of spoils for plants. Acidic spoils also tend to be much more droughty than adjacent nonacid spoils as the result of a restricted rooting depth. Conclusions indicate that mine spoils may be successfully reclaimed when proper levels of soil fertility have been restored. (Wares-IPA)
W78-05615

CATAWISSA CREEK MINE DRAINAGE ABATEMENT PROJECT,
Gannett, Fleming, Corddry and Carpenter, Inc., Harrisburg, PA.
A. F. Miorin, R. S. Klingensmith, F. J. Knight, R. E. Heizer, and J. R. Saliunas.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 256, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA-600/7-77-124, November 1977. 165 p, 21 fig, 8 tab, 1 ref, 4 append. 14010 DSD.

Descriptors: *Coal mine wastes, *Water pollution control, Pennsylvania, *Mine drainage, Acid mine water, Economics, Water table, Flooding, Water quality, Pollution abatement, Catawissa Creek(Penn), Anthracite, Sealing, Streambed relocation.

The feasibility of flooding underground coal mine workings in an isolated basin of coal to restore or partially restore the groundwater table in the basin and reduce the production of acid mine drainage was investigated in a small discrete basin in east-central Pennsylvania at Sheppton. Studies were made of regional and areal geology, the extent of strip and deep mining, and the water level tunnel flows and water quality. Internal tunnel investigations and core borings above potential seal sites and at anticipated future overflow points were made. About 80% of the basin could be inundated by sealing the tunnels to reduce acid discharge into a nearby creek. The watershed's streambed was relocated to prevent streamflow from passing into and emitting from the mined basin. The mine sealing project was not completed due to the high estimated cost (over $600,000 for one seal), consequently the methodology utilized in determining the feasibility of restoring the groundwater table and in reducing production of acid mine drainage and in effecting these changes was not verified. Flow rates (creek and tunnels) data which were to be compared between preconstruction and post-construction periods were not obtained. The appendices contain a typical agreement and grant of easement for such a project, logs of test borings, results of laboratory tests on rock samples, and results of chemical tests of tunnel rock samples. (Wares-IPA)
W78-05616

MINE DRAINAGE CONTROL FROM METAL MINES IN A SUBALPINE ENVIRONMENT: A FEASIBILITY STUDY.
Montana Dept. of Natural Resources and Conservation, Helena. Engineering Bureau.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-277 089, Price codes: A09 in paper copy, A01 in microfiche. Report No. EPA-600/2-77-224, November 1977. 168 p, 49 fig, 24 tab, 31 ref, 8 append. IBB604, S-802671.

Descriptors: *Acid mine drainage, *Mines, *Mills, Mine wastes, Reclamation, Montana, Rehabilitation, Sampling, Water quality, Observation wells, Water levels, Stream gages, Geology, Hydrology, Biology, Fish, Sealing, Environmental effects, Heavy metals, Bioassay, Cooke City(MT), Tailings, Subalpine.

Investigations of the McLaren mine and mill areas and the Glengary mine area near Cooke City, Montana were undertaken from July 1973 through September 1975 to examine the acid mine drainage from these sources and determine the feasibility of rehabilitating these subalpine mining and mill areas. Several surface water quality monitoring stations at each of the three project sites were selected. Ten observation wells were installed in the McLaren mill tailings pond area to study the groundwater regime of the tailings. Water levels and quality were monitored. Stream gauging equipment was installed and flow measurements, water level measurements, and water sampling continued throughout the winter and spring of 1973-1974. A geological review of the area was conducted and several areas suspected of natural acid water formation were examined. A biological study was conducted to determine the existing degraded biological conditions of the streams within the project area and the extent of reclamation required to restore a viable fishery to the streams. Proposed reclamation included recontouring and revegetating land surfaces, sealing shafts in the mine area, and isolating the tailings from Soda Butte Creek. The appendices contain data on climate, methodology of investigation, acid mine drainage effects on streams, water quality analysis, snow samples chemistry, wells and drilling, and McLaren mill water levels. (Wares-IPA)
W78-05618

FIELD MEASUREMENT OF DENITRIFICATION,
California Univ., Davis. Dept. of Land, Air and Water Resources.
For primary bibliographic entry see Field 5A.
W78-05619

PROTECTION OF SHELLFISH WATERS.
Environmental Protection Agency, Washington, DC. Office of Water Program Operations.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 790, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA/430/9-74/010, July 1974. 18 p, 2 ref, 2 append.

Descriptors: *Shellfish, *Sewage treatment, *Industrial wastes, Waste treatment, Waste water treatment, Cites, Public health, Toxicity, Streamflow, Ecology, Construction, Grants, Sewage, Assessments, Safety zone.

A compilation of informartion, with applicability to all projects which could affect shellfish waters, is presented to assist in maintaining a high degree of reliability in the protection of such waters. Guidelines are given for grants applicants to determine if the proposed project could affect shellfish waters, to assess the impact of the project on these waters, to estimate the size of a closed safety zone around the proposed outfall site, to base the waste water treatment works design on established guidelines and criteria, and to provide specific shellfish protection instructions in the operation and maintenance manual for such treatment facilities. Where an effect on shellfish waters is expected, assessment will include specification of volume, location, and quality of effluent, effects of uncontrolled discharges, reliability of processes and equipment, present water conditions and variables, and permitting informtion. Based on this assessment, a safety zone can be designed for both normally operating and malfunctioning works. Provision must also be made for disinfection. Technical assistance sources besides EPA regional offices are listed in the appendices; including state shellfish regulatory agencies and regional offices of the Food and Drug Administration. (Wares-IPA)
W78-05622

MANAGEMENT: SOUTHEAST CONTINENTAL SHELF STUDIES,
Skidaway Inst. of Oceanography, Savannah, GA.
For primary bibliographic entry see Field 6E.
W78-05625

COASTAL MORPHOLOGY, SEDIMENTATION AND OIL SPILL VULNERABILITY,
South Carolina Univ., Columbia. Div. of Coastal Research.
M. O. Hayes, and C. H. Ruby.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 16. Hazards, p 1-86, March 1977. 37 fig, 3 tab, 25 ref, append. 03-5-022-82.

Descriptors: *Morphology, *Oil spills, *Water pollution effects, *Sediments, *Hazards, Baseline studies, Resources development, Alaska, Coasts, *Outer Continental Shelf, Gulf of Alaska, Petroleum development, Offshore operations.

Conclusions regarding the vulnerability of the various environments of the Gulf of Alaska are presented in detail in the first paper, 'Potential Oil Spill Impacts' by Miles O. Hayes and Christopher H. Ruby, of this report. Very briefly they indicate that slightly more than 50% of the 1773.4 km of shoreline classified are considered high risk environments. Oil would remain in these areas for periods of time ranging from a few years to as much as 10 years. In the second section of this report, 'Sedimentology' by Christopher H. Ruby, detailed sedimentological analysis of the 400+ sediment samples collected is presented. This section is followed by an appendix which contains the grain size data as well as compositional data. Topographic maps of the study area with an oil vulnerability risk classification overlay are provided. (See also W78-05221) (Sinha-OEIS)
W78-05628

THE ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY OF THE GULF OF ALASKA COASTAL PLAIN AND THE COASTAL ZONE OF KOTZEBUE SOUND,
Alaska Univ., College. Dept. of Solid Earth Science.
For primary bibliographic entry see Field 2L.
W78-05632

THE ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY OF THE GULF OF ALASKA COASTAL PLAIN,
Alaska Univ., College. Div. of Geoscience.
For primary bibliographic entry see Field 2L.
W78-05633

SEISMIC AND VOLCANIC RISK STUDIES - WESTERN GULF OF ALASKA,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W78-05640

FINAL REPORT AND RECOMMENDATIONS FOR THE BIG CYPRESS AREA OF CRITICAL STATE CONCERN TO THE STATE OF FLORIDA ADMINISTRATION COMMISSION.
Florida State Dept. of Administration, Tallahassee. Div. of State Planning.
Report No. CA 73-2, October 1973, 75 p, 6 fig, 1 tab, 87 ref.

Descriptors: *Boundaries(Surfaces), *Ecosystems, *Regulation, *Florida, *Management, Estuarine environment, Estuarine fisheries, Mangrove swamps, Land use, Planning, Aquifer management, Swamps, Legislation, Land development, Environmental effects, *Area of Critical State Concern, Big Cypress Area of Critical State Concern(FL), *Big Cypress National Fresh Water Reserve(FL), Everglades National Park(FL).

Background information is provided regarding the recommended boundary and land development regulations for the Big Cypress Area of Critical State Concern. The Big Cypress Area is viewed as a composite of interrelated natural systems. The recommended boundary recognizes the binding ecological links between the proposed Federal Big Cypress National Fresh Water Reserve, Everglades National Park, and contiguous estuarine coastal areas. Proposed critical area regulations recognize the necessity to preserve coastal mangroves and marshes for fish nurseries, protect vulnerable aquifer recharge areas, protect freshwater swamps and marshes for water storage, and preserve naturally vegetated areas for their ability to slow down surface water flow and absorb pollutants. This approach assumes that nature will continue to perform these essential functions in a recurring, self-maintaining and non-inflationary manner, barring undesirable development activity. This study was completed pursuant to the Florida legislative mandate contained in the Big Cypress Conservation Act of 1973. The Act both appropriated funds for land acquisition and authorized use of eminent domain proceedings. The boundaries recommended in this report may be changed at a future date if it is found that a

more expansive area is required to protect the Critical Area. (Nessa-NC)
W78-05654

STATISTICAL SUMMARY OF MUNICIPAL WATER FACILITIES COMMUNITIES OF 25,000 POPULATION AND OVER, AS OF JANUARY 1, 1960.
Public Health Service, Rockville, MD.
For primary bibliographic entry see Field 5F.
W78-05656

A REVIEW OF STATE AGENCIES IMPACTING REGIONAL WATER QUALITY MANAGEMENT.
Miami Valley Regional Planning Commission, Dayton, OH; and Linton and Co., Inc., Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 373, Price codes: A04 in paper copy, A01 in microfiche. Prepared for Environmental Protection Agency, Washington, DC, Water Planning Division, March 1976, 55 p.

Descriptors: *Resources, *Management, *Administration, *Regulation, *Federal Water Pollution Control Act, *Water management(Applied), Water supply, Wastewater treatment, Flood plains, Solid wastes, Land use, Financing, Operation and maintenance, Planning, *Ohio, *Areawide Waste Treatment Management Plan(PL 92-500, Section 208), Water resources management, Statelevel agencies.

This is one of a series of eight reports providing background information necessary for development of the management component of the Miami Valley Regional Planning Commission's (MVRPC) Section 208 Areawide Water Quality Management Plan and Program. In this volume, ten state-level agencies in Ohio which have programs relating to land use, wastewater management, water supply, floodplain management, nonpoint source pollution, solid waste and transportation are identified. Each description includes the agency's geographic jurisdiction, basis of authority, areawide water quality related functions, operational constraints and relationships with other local, state and federal water resource agencies. Each agency's role in either financing, regulating, operating and maintaining, administering, planning or providing technical assistance to water quality programs is explained. The information is presented in narrative outline form for use in the Section 208 (PL 92-500) Areawide Waste Treatment Management Plan. (Zayac-NC)
W78-05657

HAWAII COASTAL ZONE MANAGEMENT PROGRAM, TECHNICAL SUPPLEMENT 2. MANAGEMENT OF HAWAII'S COASTAL ZONE FOR WATER QUALITY OBJECTIVES,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 6G.
W78-05659

POLLUTION FROM DREDGING OPERATIONS,
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemical Engineering and Rensselaer Polytechnic Inst., Troy, NY. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W78-05673

HAZARDOUS MATERIALS WASTE DISPOSAL (A BIBLIOGRAPHY WITH ABSTRACTS).
National Technical Information Service, Springfield, VA.
For primary bibliographic entry see Field 5F.
W78-05675

CRITERIA FOR THE ESTABLISHMENT AND MAINTENANCE OF TWO YEAR POST HIGH SCHOOL WASTEWATER TECHNOLOGY TRAINING PROGRAMS, VOLUME I: PROGRAM CRITERIA.
Clemson Univ., SC. Dept. of Environmental Systems Engineering.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 713, Price codes: A04 in paper copy, A01 in microfiche. Report prepared for EPA, Washington, D.C., Training Grants Branch. 1970. Volume I of II, 45 p, 1 fig, 1 append. EPA-1TT1-WP-52-01.

Descriptors: *Training, *Institutions, *Evaluation, *Performance, *Waste water treatment, *Manpower, *Sewage treatment, Human resources, Management, Grants, Methodology, *Post high school training programs, *Specialized training, *Handbooks, Individualized training, *Programmed instruction, *Personnel development, Water Quality Improvement Act of 1970, Public Law 91-224, Waste water treatment plants, Training programs, Guidelines.

Criteria for the development of useful land practical training programs which will meet manpower requirements in wastewater treatment plants are presented. These criteria are also intended to aid in the selection of institutions and training facilities, and are arranged in a form which is appropriate for soliciting a self-appraisal by interested institutions. Trainee characteristics before and after training, the form and function of the management structure for the overall program, and a glossary of important terminology are included. Curriculum guidelines are outlined in Volume II. (Seip-IPA)
W78-05688

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

ECONOMIC EFFECT ON AGRICULTURAL PRODUCTION OF ALTERNATIVE ENERGY INPUT PRICES: TEXAS HIGH PLAINS,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 3F.
W78-05350

MULTIOBJECTIVE ANALYSIS IN THE MAUMEE RIVER BASIN: A CASE STUDY ON LEVEL-B PLANNING,
Case Western Reserve Univ., Cleveland, OH. Dept. of Systems Engineering.
Y. Y. Haimes, P. Das, and K. Sung.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 206, Price codes: A10 in paper copy, A01 in microfiche. Report No. SED-WRG-77-1, January, 1977. 188 p, 10 fig, 23 tab, 87 ref. OWRT C-7047(No 6221)(1), AEN75015820.

Descriptors: *Land resources, *Water resources, *Mathematical modeling, *Planning, *Management, *River basin development, Methodology, Ohio, *Integrated multiobjective planning model, *Multiobjective modeling, *Level-B planning, *Maumee River basin, Surrogate Worth Trade-Off Method(SWT).

A Level-B planning and management framework for solving critical problems of water and land resources in the Maumee River Basin is developed. Chapters 1-2 present a general overview of the problems and complexities inherent in regional planning, developing, and describing relevant objectives and constraints. A hierarchical multiobjective model in water and land resources is presented; its importance and significance are discussed. Six noncommensurable objectives are identified in the mathematical modeling. Chapter 3 presents a detailed development of mathematical submodels which are responsive to each objective and which are applicable to the Maumee Basin. Chapter 4 presents the methodology for integrating each objective in order to form a Integrated Multiobjective Planning Model. Chapter 5 is a summary of the data necessary for solving the integrated model. Trade-off analyses, using the Surrogate Worth Trade-off method (SWT), are conducted. The implications, the associated levels of each of the noncommensurable objectives, and computational procedures and results are presented. Chapter 7 presents an overall summary and critical analysis of the planning process, multiobjective modeling, and the Applicability of the SWT method. (Seip-IPA)
W78-05484

A STUDY OF THE IMPACT OF THE WETLANDS EASEMENT PROGRAM ON AGRICULTURAL LAND VALUES,
Northern State Coll., Aberdeen, SD. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W78-05652

INDUSTRY-SPECIFIC GROSS OUTPUT MULTIPLIERS FOR BEA ECONOMIC AREAS.
Department of Commerce, Washington, DC. Div. of Regional Economic Analysis.
Guideline 5-Regional Multipliers, U.S. Water Resources Council, January 1977, 135 p, 12 tab, 1 chart, 1 map, 5 append.

Descriptors: *Regional analysis, *Water resources development, *Input-output analysis, Industrial production, Agriculture, Employment, Economics, *Regional multipliers, Economic areas.

Input-output type multipliers are relating changes in regional total gross output to changes in a specific-industry final demand, for 56 industrial sectors for each of 173 Bureau of Economic Analysis (BEA) economic areas of the U.S. This sectoring plan provides considerable detail among the agriculture and food processing industries, and moderate detail among other manufacturing industries. The user must independently estimate the initial final demand changes by industry, typically in terms of regional exports due to the program under study. The user must then select the appropriate industrial sector multiplier for his study region from the report. The product of the initial change and the multiplier provides an estimate of the change in total gross output in the region which is attributed to a particular element of the project or program. The sum of such calculations for all elements is the estimate of regional change due to the water development project. Procedures are provided for converting this regional total gross output change into a change in earnings and employment. (Zayac-NC)
W78-05655

6B. Evaluation Process

EXECUTIVE SUMMARY, DIRECTIONS IN U. S. WATER RESEARCH: 1978-1982.
Federal Coordinating Council for Science, Engineering and Technology, Washington, DC. Committee on Water Resources Research.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 808, Price codes: A08 in paper copy, A01 in microfiche. Submitted to Chairman, Committee on Water Resources Research, by Ad Hoc COWRR Committee on Research Needs. October 1977. 22 p, 3 fig, 1 tab.

Descriptors: *Water resources research, *Research and development, *Future planning(Projected), Projections, Planning, Water policy, *Federal project policy, *Project planning,

*Research projects, Expenses, Economics, Research priorities.

This summarizes the more detailed report entitled 'Directions in U. S. Water Research: 1978-1982.' (See W78-03428). It is the product of the Committee on Water Resources Research (COWRR) of the Federal Coordinating Council for Science, Engineering and Technology. It suggests the course of federally sponsored water research so that funds spent in the pursuit of new knowledge will bear upon those problems in which water is a national issue. Specific research projects are not recommended. It presents the major issues in which water is a vital factor, and it identifies those areas or technical disciplines in which research is needed if the issues are to be addressed properly. (OWRT)
W78-05203

EVALUATION OF ALTERNATIVE PROCEDURES FOR REVIEW OF WATER RESOURCES RESEARCH PROPOSALS.
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 9D.
W78-05344

WATER RESOURCES RESEARCH IN PENNSYLVANIA.
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 9D.
W78-05351

MINUTES - IOWA STATE WATER RESOURCES RESEARCH INSTITUTE ADVISORY BOARD AND COUNCIL TENTH ANNUAL MEETING.
Iowa State Water Resources Research Inst., Ames.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 033, Price codes: A06 in paper copy, A01 in microfiche. September, 1975. 111 p, 3 tab, 8 append. OWRT A-999-IA(10).

Descriptors: *Iowa, *Water Resources Research Act, *Water resources development, *Research, Priorities, Water quality control, Water quality standards, Management, Planning.

Minutes of the September 23, 1975 meeting of the Iowa State Water Resources Research Institute (ISWRRI) Advisory Board and Council are presented. A research evaluation and priority worksheet matrix compilation identifies problems and assigns points on the basis of priority; the ten highest priority research areas are listed in three summary evaluations. Appendices contain: (1) a list of attendees, (2) members lists of the ISWARRI Advisory Board and Council, (3) director's statement, (4) a statement of support for research priorities (August 1975), (5) a statement of support (July 1975), (6) a detailed listing of Iowa water problems by water use categories (April 1975), (7) comments and suggestions of Advisory Board members, and (8) a list of current and completed projects. (Seip-IPA)
W78-05353

A GUIDE TO ENVIRONMENTAL PLANNING AND DEVELOPMENT, (LEHIGH-NORTHAMPTON COUNTIES JOINT PLANNING COMMISSION),
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
W. R. Patzke.
Report JPC-NATRES-74-350-405.1, September 1974. 61 p, 15 fig, 28 ref, 2 append.

Descriptors: *Planning, *Flood plains, *Land use, *Land management, *Land development, *Environmental effects, Water table, Aquifers, Wetlands, Drainage, Bedrock, Geology, Slope protection, Soil moisture, Soil management, Administration, Regulation, Zoning, Non-structural alternatives, *Pennsylvania, Lehigh County(PA), Northampton County(PA), *Environmental management.

This guide analyzes the region's key environmental factors, including floodplains, water table, wetlands, aquifers, drainage, soil permeabilities, slopes and bedrock geology. Each factor is defined, followed by a discussion of major problems that could be caused by making land use decisions that do not take these factors into account. Sources of data available on each factor are identified. Finally, methods that can be employed to control future development in environmentally sensitive areas are discussed. The handbook is intended to provide a better understanding of the environmental factors in the region so that sound decisions can be made by public officials and others involved in the future development of the Lehigh Valley. (Zayac-NC)
W78-05394

SOLID WASTE MANAGEMENT PLAN, (LEHIGH-NORTHAMPTON COUNTIES JOINT PLANNING COMMISSION).
Weston (Roy F.) Inc., West Chester, PA.
For primary bibliographic entry see Field 5G.
W78-05395

SOLID WASTE MANAGEMENT PLAN-1977 SUPPLEMENT (LEHIGH-NORTHAMPTON JOINT PLANNING COMMISSION),
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
For primary bibliographic entry see Field 5G.
W78-05396

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT: MAIN REPORT.
Coastal Zone Resources Corp., Wilmington, NC.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-034 144, Price codes: A15 in paper copy, A01 in microfiche. Prepared for Office, Chief of Engineers, Army Corps of Engineers, May 1975. 322 p, 70 tab. DACW73-75-C-0001.

Descriptors: *Management, Water resources development, *Multiple purpose projects, *Recreation facilities, Wildlife management, Fish management, Legal aspects, Legislation, Land use, Recreation demand, Planning, *Reservoirs, *Water Resource Development Projects.

This study's purpose is to evaluate the role of the Army Corps of Engineers in the management of recreation, fish, and wildlife resources at Corps water resource development projects (WRDP's). The study's findings, conclusions, and recommendations were developed through the performance of the following tasks: existing Corps policies, laws, and regulations relating to land use, recreation, fish and wildlife practices were assessed and classified; pertinent literature and national data were reviewed to provide base information for the performance of subsequent tasks; information was compiled by field surveys of 29 out of 407 representative WRDP's, the results of which are both summarized here and presented as case studies in separate volumes; the analyses generated by previous tasks were used to appraise Corps land use, recreation, and fish and wildlife practices; national water-oriented recreation needs were projected; major problems resulting from an inadequate resource base or its inefficient management were identified; the consequences of four alternative solutions to existing management problems were evaluated; and finally, a recommended course of action was detailed. The study's findings, recommendations, and conclusions are presented in this volume. The documentation has been compiled in four fully referenced technical appendices. (See W78-05401 thru W78-05407) (Nessa-NC)
W78-05400

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT: APPENDIX B - FOUNDATION FOR LEGAL ANALYSIS.
Coastal Zone Resources Corp., Wilmington, NC.
Available from the National Technical Information Service, Springfield, VA 22161 ADA-034 145, Price codes: A03 in paper copy, A01 in microfiche. Prepared for Office, Chief of Engineers, Army Corps of Engineers, May 1975. 26 p. DACW73-75-C-0001.

Descriptors: *Legal aspects, *Legislation, *Management, Water resources development, *Multiple purpose projects, Land use, Planning, Recreation demand, Wildlife management, Fish management, *Water Resources Development Projects.

This study's purpose is to evaluate the role of the Army Corps of Engineers in the management of recreation, fish, and wildlife resources at Corps water resource development projects (WRDP's). The main report of the study includes findings, recommendations and conclusions. In addition, there are a total of four technical appendices presenting documentation of the study. This volume is a compilation and classification of all legal authorities material to the study. The United States code was surveyed both section by section and by key words, the titles of relevant statutes were gathered from various compendia, and relevant regulations were obtained from the office of the Chief of Engineers. Each statutory and regulatory authority has been classified according to a general topic outline. The outline reflects the subject areas being studied. The relevant legal authorities are also presented in an orderly arrangement, with each indexed to the pertinent topic or topics in the general outline. The data contained in this volume are only part of the information used to complete the study. The study ultimately identifies major problems resulting from an inadequate resource base or its inefficient management at WRDP's. Four alternative solutions to these problems are identified, and a course of action is recommended. (See also W78-05400) (Nessa-NC)
W78-05401

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT. APPENDIX C - FEDERAL AND STATE AGENCY PROFILES.
Coastal Zone Resources Corp., Wilmington, NC.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-034 146, Price codes: A17 in paper copy, A01 in microfiche. Prepared for Office, Chief of Engineers, Army Corps of Engineers, May 1975. 365 p. DACW73-75-C-0001.

Descriptors: *Reservoirs, Water resources development, *Multiple purpose projects, *Recreation facilities, *Federal government, *State governments, Legal aspects, Land management, Fish management, Wildlife management, Land use, Washington, Texas, Pennsylvania, Tennessee, Missouri, Minnesota, *Water Resource Development Projects.

This study's purpose is to evaluate the role of the Army Corps of Engineers in the management of recreation, fish and wildlife resources at Corps Water Resource Development Projects (WRDP's). This volume describes the major Federal entities concerned with this endeavor, including the U.S. Forest Service, the National Park Service, the Bureau of Land Management, the U.S. Fish and Wildlife Service, the Tennessee Valley Authority, and the Bureau of Reclamation. Each agency is

described in terms of general statutory authorities; budget and funding sources; administrative organizations; fees, charges and in-lieu payment arrangements; and authorities for acquisitions and leases. The same descriptive organization is used to present state agency profiles of Minnesota, Missouri, Pennsylvania, Tennessee, and Texas. These states were selected because they would provide a wide range of activities and information from various levels of state effort, various levels of Corps effort, and various management practices. Particular attention is paid to unique activities in the Pennsylvania, Texas, and Washington profiles. Other agencies and groups concerned with land use for recreation and fish and wildlife enhancement were consulted, including the Bureau of Outdoor Recreation, Council on Environmental Quality, National Recreation and Parks Association, National Conference on State Parks, and the Bureau of the Census. The main study report includes findings, recommendations and conclusions. There are four technical appendices presenting documentation of the study. (See also W78-05400) (Nessa-NC)
W78-05402

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT. APPENDIX D; VOLUME I - CASE STUDIES D.1.1 TO D.5.1.
Coastal Zone Resources Corp., Wilmington, NC.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-034 147, Price codes: A09 in paper copy, A01 in microfiche. Prepared for Office, Chief of Engineers, Army Corps of Engineers, May 1975. 192 p. DACW73-75-C-0001.

Descriptors: *Management, Water resources development, *Multiple purpose projects, *Recreation facilities, *Recreation demand, *State governments, *Federal government, *Administrative agencies, *Reservoirs, Wildlife management, Fish management, Legal aspects, Legislation, Land use, Planning, *Water Resource Development Projects, Wappapello Dam and Reservoir(MO), Lake Ouachita(Blakely Mountain)(AR), Fort Peck Reservoir(MT), Oahe Reservoir(SD ND), Colebrook River Lake(CT MA).

This study's purpose is to evaluate the role of the Army Corps of Engineers in the management of recreation, fish, and wildlife resources at Corps Water Resource Development Projects (WRDP's). Appendix D documents the inspection and analysis of a representative sample of WRDP's. The WRDP's evaluated in this volume include Wappapello Dam and Reservoir, Lake Ouachita (Blakely Mountain), Fort Peck Reservoir, Oahe Reservoir, and Colebrook River Lake. Subsequent volumes consider 24 other WRDP's. Selection from among the 407 WRDP's was based on 12 factors that were found to be good indicators of major physical characteristics of WRDP's, the range and complexity of recreation and fish and wildlife programs, and the local management practices. The 12 factors and the relationship to the factors of the 29 WRDP's were: geographic location; concentration of Corps activity; land acquisition policies; complexity of shoreline management; water surface management; relation with other Federal agencies; relations with state governments; urban versus rural setting; size of Corps management responsibility; recreation visitor usage; interrelationships with all other project purposes; and complexity of real estate programs and practices. Significant findings representing problem areas, data conflicts, resource management approaches, agency relationships, and viable program practices are discussed. The main study report includes findings, recommendations and conclusions. Four technical appendices present documentation of the study. (See also W78-05400) (Nessa-NC)
W78-05403

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT, APPENDIX D, VOLUME II, CASE STUDIES D.6.1 TO D.13.1.
Coastal Zone Resources Corp., Wilmington, NC.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-034 148, Price codes: A10 in paper copy, A01 in microfiche. Prepared for Office, Chief of Engineers, Army Corps of Engineers, May 1975. 200 p. DACW73-75-C-0001.

Descriptors: *Management, Water resources development, *Multiple purpose projects, *Recreation facilities, *Recreation demand, *State governments, *Federal government, *Administrative agencies, *Reservoirs, Wildlife management, Fish management, Legal aspects, Legislation, Land use, Planning, *Water Resource Development Projects, Hopkinton-Everett Lakes(NH), Foster Joseph Sayers Dam and Reservoir(PA), Chesapeake and Delaware Canal(DE MD), Upper Mississippi River, Pool No 21(IL MO), Lake Ashtabula(ND), Leech Lake and Dam(MN), Pend Oreille Lake(Albeni Falls Dam)(IO), John Day Lock and Dam(OR WA).

This study's purpose is to evaluate the role of the Army Corps of Engineers in the management of recreation, fish, and wildlife resources at Corps Water Resources Development Projects (WRDP's). Appendix D documents the inspection and analysis of a representative sample of WRDP's. The WRDP's evaluated in this volume include Hopkinton-Everett Lakes, Foster Joseph Sayers Dam and Reservoir, Chesapeake and Delaware Canal, Upper Mississippi River, Pool No. 21, Lake Ashtabula, Leech Lake and Dam, Pend Oreille Lake (Albeni Falls Dam), and John Day Lock and Dam. The other volumes in this Appendix consider 21 other WRDP's. Selection from among the 407 WRDP's was based on 12 factors that were found to be good indicators of major physical characteristics of WRDP's, the range and complexity of recreation and fish and wildlife programs, and the local management practices. The 12 factors and the relationship to the factors of the 29 WRDP's were: geographic location; concentration of Corps activity; land acquisition policies; complexity of shoreline management; water surface management; relation with other Federal agencies; relations with state governments; urban versus rural setting; size of Corps management responsibility; recreation visitor usage; interrelationships with all other project purposes; and, complexity of real estate programs and practices. Significant findings representing problem areas, data conflicts, resource management approaches, agency relationships, and viable program practices are discussed. The main study report includes findings, recommendations and conclusions. Four technical appendices present documentation of the study. (See also W78-05400) (Nessa-NC)
W78-05404

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT, APPENDIX D, VOLUME III, CASE STUDIES D.14.1 TO D.22.1.
Coastal Zone Resources Corp., Wilmington, NC.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-034 149, Price codes: A12 in paper copy, A01 in microfiche. Prepared for Office, Chief of Engineers, Army Corps of Engineers, May 1975. 244 p. DACW73-75-C-0001.

Descriptors: *Management, Water resources development, *Multiple purpose projects, *Recreation facilities, *Recreation demand, *State governments, *Federal government, *Administrative agencies, *Reservoirs, Wildlife management, Fish management, Legal aspects, Legislation, Land use, Planning, *Water Resources Development Projects, Dworshak Reservoir(ID), Cordell Hull Dam and Reservoir(TN KY), Wolf Creek Dam and Lake Cumberland(KY), Old Hickory Reservoir(TN), J Percy Priest Reservoir(TN), Mosquito Creek Reservoir(OH), Warrior Lock and Dam(AL), Jones Bluff Lock and Dam(AL), Clark Hill Reservoir(GA SC).

This study's purpose is to evaluate the role of the Army Corps of Engineers in the management of recreation, fish, and wildlife resources at Corps' water resources development projects (WRDPs). Appendix D documents the inspection and analysis of a representative sample of WRDPs. The WRDPs evaluated in this volume include Dworshak Reservoir, Cordell Hull Dam and Reservoir, Wolf Creek Dam and Lake Cumberland, Old Hickory Reservoir, J. Percy Priest Reservoir, Mosquito Creek Reservoir, Warrior Lock and Dam, Jones Bluff Lock and Dam, and Clark Hill Reservoir. The other volumes in this Appendix consider 20 other WRDPs. Selection from among the 407 WRDPs was based on 12 factors that were found to be good indicators of major physical characteristics of WRDPs, the range and complexity of recreation and fish and wildlife programs, and the local management practices. The 12 factors and the relationship to the factors of the 29 WRDPs were: geographic location; concentration of Corps activity; land acquisition policies; complexity of shoreline management; water surface management; relation with other Federal agencies; relations with state governments; urban versus rural setting; size of Corps management responsibility; recreation visitor usage; interrelationships with all other project purposes; and, complexity of real estate programs and practices. Significant findings representing problem areas, data conflicts, resource management approaches, agency relationships, and viable program practices are discussed. The main study report includes findings, recommendations and conclusions. Four technical appendices present documentation of the study. (See also W78-05400) (Nessa-NC)
W78-05405

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT, APPENDIX D, VOLUME IV, CASE STUDIES D.23.1 TO D.29.1.
Coastal Zone Resources Corp., Wilmington, NC.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-034 150, Price codes: A11 in paper copy, A01 in microfiche. Prepared for Office, Chief of Engineers, Army Corps of Engineers, May 1975. 237 p. DACW73-75-C-0001.

Descriptors: *Management, Water resources development, *Multiple purpose projects, *Recreation facilities, *Recreation demand, *State governments, *Federal government, *Administrative agencies, *Reservoirs, Wildlife management, Legal aspects, Legislation, Land use, Planning, Fish management, *Water Resource Development Projects, Hartwell Reservoir(SC GA), Alamo Lake(AZ), Lake Isabella(CA), Table Rock Dam and Reservoir(MO AR), Eufaula Lake(OK), Robert S Kerr Lock and Dam and Reservoir(OK), Denison Dam-Lake Texoma(OK TX).

This study's purpose is to evaluate the role of the Army Corps of Engineers in the management of recreation, fish, and wildlife resources at Corps' water resources development projects (WRDPs). Appendix D documents the inspection and analysis of a representative sample of WRDPs. The WRDPs evaluated in this volume include Hartwell Reservoir, Alamo Lake, Lake Isabella, Table Rock Dam and Reservoir, Eufaula Lake, Robert S. Kerr Lock and Dam and Reservoir, and Denison Dam-Lake Texoma. The other volumes in this Appendix consider 22 other WRDPs. Selection from among the 407 WRDPs was based on 12 factors that were found to be good indicators of major physical characteristics of WRDPs, the range and complexity of recreation and fish and wildlife programs, and the local management prac-

tices. The 12 factors and the relationship to the factors of the 29 WRDPs were: geographic location; concentration of Corps activity; land acquisition policies; complexity of shoreline management; water surface management; relation with other Federal agencies; relations with state governments; urban versus rural setting; size of Corps management responsibility; recreation visitor usage; interrelationships with all other project purposes; and, complexity of real estate programs and practices. Significant findings representing problem areas, data conflicts, resource management approaches, agency relationships, and viable program practices are discussed. The main study report includes findings, recommendations and conclusions. Four technical appendices present documentation of the study. (See also W78-05400) (Nessa-NC)
W78-05406

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT: APPENDIX E--CONSOLIDATED BIBLIOGRAPHY.
Coastal Zone Resources Corp., Wilmington, NC.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-034 151, Price codes: A03 in paper copy, A01 in microfiche. Prepared for Office, Chief of Engineers, Army Corps of Engineers, May 1975. 28 p. DACW73-75-C-0001.

Descriptors: *Management, Water resources development, *Multiple purpose projects, *Recreation facilities, *Reservoirs, Wildlife management, Fish management, Legal aspects, Legislation, Land use, Recreation demand, Planning, *Water Resource Development Projects.

This study's purpose is to evaluate the role of the Army Corps of Engineers in the management of recreation, fish, and wildlife resources at Corps water resources development projects (WRDPs). This volume lists alphabetically all literature that was consulted. The study's findings, conclusions, and recommendations were developed through the performance of the following tasks. Existing Corps policies, laws, and regulations relating to land use, recreation, fish and wildlife practices were assessed and classified. Pertinent literature and national data were reviewed to provide base information for the performance of subsequent tasks. Information was compiled by field surveys of 29 (out of 407) representative WRDPs, the results of which are both summarized in the main report and presented as case studies in technical appendices. The analyses generated by previous tasks were used to appraise land use, recreation, and fish and wildlife practices. National water oriented recreation needs were projected. Major problems resulting from an inadequate resource base or its inefficient management were identified. The consequences of four alternative solutions to existing management problems were evaluated. Finally, a recommended course of action was detailed. The study's findings, recommendations, and conclusions are presented in the main report. The documentation has been compiled in four fully referenced technical appendices. (See also W78-05400) (Nessa-NC)
W78-05407

THE EVALUATION OF WATER AND RELATED LAND RESOURCE PROJECTS: A PROCEDURAL TEST.
Oklahoma Univ., Norman. Dept. of Civil Engineering and Environmental Science.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 678, Price codes: A04 in paper copy, A01 in microfiche. (1972) 47 p, 14 ref.

Descriptors: *Regional development, *Regional analysis, *Economics, *Benefits, *Multiple-purpose reservoirs, *Water resources development, Planning, Environmental effects, National income, Management, Administration, Flood damage, Land use, Indirect benefits, Water supply, Cost analysis, Recreation, *Poteau River(AR), Environmental accounts, Well-being accounts.

A faculty-directed test team from the University of Oklahoma critically reviewed the Poteau River Watershed Project, a multi-purpose resource development project. The team first reclassified objectives into four categories: national income, regional development, environmental, and well-being. These objectives were then subjected to the following methodologies to measure project effects: flood damage reduction benefits; changed and/or more intensive land use benefits; recreation benefits; redevelopment benefits; municipal water supply benefits; secondary benefits; and annual cost. The test team found inadequacies in the initial Project's evaluation of benefits, disagreed with the use of subsidized prices rather than free market approximations for agricultural benefit estimation, declared that a higher value should be placed on the visitor-day use of recreational areas, and opined that secondary benefits from the national viewpoint should be considered. Finally, the test team suggested that the alternative plans generated in the initial report should be broadened in scope rather than simply being alternative means of supplying water or flood control to the region. Recommendations included suggestions for: a systemic comparison of expenditures (water, transportation, health, education) against each other; the consideration of water resources as a means of regional development; a distinction between long- and short-term goals; plan flexibility; and the bearing of a project cost by the group to whom the benefits will accrue. (Zayac-NC)
W78-05408

WATER RESEARCH: SOLVING COLORADO'S WATER PROBLEMS,
Colorado State Univ Fort Collins. Water Resources Research Inst.
D. Zimmerman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 172, Price codes: A03 in paper copy, A01 in microfiche. November, 1977. 36 p. OWRT A-999-COLO(4).

Descriptors: *Water resources development, *Water Resources Institute, *Colorado, Irrigation programs, Recreation facilities, Economics, Input-output model, Water demand, Flood control, Urban drainage, Sewage disposal, Heavy metals, Groundwater resources, Urban runoff, Halophytes, Water conservation, Water reuse, Solar radiation, Evaporation, *Irrigation reservoirs, *Recreation resources, South Platte River Basin(CO).

Several projects conducted by the Colorado Water Resources Research Institute are outlined. The report includes descriptive photographs and simplified procedural explanations designed for use by the general public. Sections of the report include: (1) High country irrigation reservoirs - Colorado's untapped recreation resource, (2) Colorado's economy - the role of water, (3) Answering the flood control benefit question, (4) Solving high country water and sewer problems - a planner's handbook, (5) Improving irrigation, (6) Heavy metals in groundwater - a mineral belt problem, (7) Urban runoff- a water pollution problem, (8) From cells to plants - a breakthrough in salt-tolerant varieties, (9) Stabilizing river channels, (10) Water conservation - a handbook for utility managers, (11) Water reuse - potential in the South Platte River Basin, and (12) Trapping the sun - to solve mountain sewage problems. (Seip-IPA)
W78-05481

MULTIOBJECTIVE ANALYSIS IN THE MAUMEE RIVER BASIN: A CASE STUDY ON LEVEL-B PLANNING,
Case Western Reserve Univ., Cleveland, OH. Dept. of Systems Engineering.
For primary bibliographic entry see Field 6A.
W78-05484

DEVELOPMENT OF PROCEDURES FOR COST-SHARING AND REPAYMENT ANALYSIS,
New York State Coll. of Agriculture and Life Sciences, Ithaca.
D. J. Allee, and F. Davenport.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 144, Price codes: A05 in paper copy, A01 in microfiche. Completion Report, (April, 1976). 93 p, 1 fig, 30 tab, 16 ref. OWRT C-3201(No 3701)(1).

Descriptors: *Cost sharing, *Cost repayment, Water resources development, Economic impact, Economic feasibility, New York, *Water policy, *Cost-benefit analysis, *Repayment analysis, Watershed management, *Policy-making variables, *Economic modeling, Flint Creek Small Watershed Project(NY).

Cost-sharing in water resource development is investigated with emphasis on the role of the states. A basis for state-local cost-sharing and repayment methods in water resource development projects for New York is developed. The existing federal-state cost-sharing mechanism and cost-sharing procedures followed by other programs in New York and by interstate programs are assessed. Existing and potential cost-sharing programs in municipal wastewater treatment plants, in flood contro, in municipal water supply, and in small watershed projects are discussed. The National Water Commission's Report to Congress on cost-sharing is critiqued and briefly described. The nature of the process of policy-making, economic and public administration principles, and intergovernmental relations are described. The impact of institutional settings, legal environments, political-economic behavior and intergovernmental relations on the policy-making process are outlined; an economic model is presented. Conceptual analyses of cost-sharing as a policy variable and an instrument of policy are assessed; goals, strategies, and philosophies are described. A cost-benefit analysis is included using the Flint Creek Small Watershed Project in New York as a case study in input-output modeling. (Seip-IPA)
W78-05485

A STUDY OF THE IMPACT OF THE WETLANDS EASEMENT PROGRAM ON AGRICULTURAL LAND VALUES,
Northern State Coll., Aberdeen, SD. Dept. of Economics.
R. J. Brown.
Land Economics, Vol. 52, No. 4, p 509-517, November 1976, 1 fig, 3 tab, 8 ref. Completed under contract with U.S. Fish and Wildlife Service.

Descriptors: *Wetlands, *Preservation, *Easements, Agriculture, *Market value, Pricing, Prairies, North Dakota, South Dakota, Resource allocation, *Regression analysis, *Economic impact, Multiple regression analysis, Capitalized value.

The purpose was to estimate the impact of a wetlands easement on the price of agricultural land. Two different approaches were used and the results were compared to determine the extent to which the wetlands easement was capitalized into the market price. A multiple regression of agricultural land sales in three regions in North and South Dakota was used to determine the extent to which the market valued the wetlands easement. The results of this analysis were compared with estimates of the capitalized value of net income

foregone as a result of the easement. It was concluded that in those cases where the net income foregone as a result of the easement is substantial, the market does fully capitalize the effect of the easement; where the net income foregone is small, the market price is discounted little if at all because of the easement. Even at relatively high land values, it was concluded that wetlands preservation was socially optimal. (Zayac-NC)
W78-05652

INDUSTRY-SPECIFIC GROSS OUTPUT MULTIPLIERS FOR BEA ECONOMIC AREAS.
Department of Commerce, Washington, DC. Div. of Regional Economic Analysis.
For primary bibliographic entry see Field 6A.
W78-05655

HAWAII COASTAL ZONE MANAGEMENT PROGRAM, TECHNICAL SUPPLEMENT 4. BEACHES: A COMPONENT OF THE COASTAL ZONE,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 6G.
W78-05660

HAWAII COASTAL ZONE MANAGEMENT PROGRAM: ENHANCEMENT OF COASTAL ZONE RECREATIONAL OPPORTUNITIES: A DESCRIPTION OF PRESENT COASTAL RECREATIONAL USAGE, CONSTRAINTS, DATA AND RESEARCH POSSIBILITIES IN THE STATE OF HAWAII. TECHNICAL SUPPLEMENT NO. 6,
Hawaii Univ., Honolulu. Dept. of Geography.
A. Sommarstrom.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 341, Price codes: A04 in paper copy, A01 in microfiche. Prepared for the Pacific Urban Stdies and Planning Program, University of Hawaii, August 1975, 64 p, 15 tab.

Descriptors: *Coasts, *Recreation demand, *Recreation facilities, *Management, *Hawaii, *Tourism, *Coastal areas, Parks, Planning, Projects, Research, *Coastal zone management, *Recreation enhancement.

The purpose was to investigate the variables involved in the development of a workable approach to the enhancement of Hawaii's coastal recreational opportunities. Focus is on coastal parks and coastal recreational user data because of limited data and staff. Jurisdictional coastal zone responsibilities are reviewed along with patterns of use, constraints for use, including area, access, pollution and cmpeting activities and responsibilities are recognized and recommendations for recreation managers are suggested. These include: proper objective, and objective fulfillment timetable, enunciation; creation of a data bank; identification of coastal recreation limiting factors; development of estimates of carrying capacities; recognition of recreatinal investment tradeoffs; and development of information on the relationship between the state's tourist industry and coastal recreation. (Zayac-NC)
W78-05662

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ECONOMIC EFFECT ON AGRICULTURAL PRODUCTION OF ALTERNATIVE ENERGY INPUT PRICES: TEXAS HIGH PLAINS,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 3F.
W78-05350

DEVELOPMENT OF PROCEDURES FOR COST-SHARING AND REPAYMENT ANALYSIS,
New York State Coll. of Agriculture and Life Sciences, Ithaca.
For primary bibliographic entry see Field 6B.
W78-05485

TECHNOLOGICAL ECONOMICS APPLIED TO WASTE RECOVERY AND TREATMENT PROCESSES,
Aston Univ., Birmingham (England). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W78-05496

MODIFICATIONS OF ORNL'S COMPUTER PROGRAMS MSF-21 AND VTE-21 FOR THE EVALUATION AND RAPID OPTIMIZATION OF MULTISTAGE FLASH AND VERTICAL TUBE EVAPORATORS,
Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 3A.
W78-05692

6D. Water Demand

WATER REQUIREMENTS AND APPLICATION RATES FOR LAWNS,
Wyoming Univ., Laramie. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3D.
W78-05201

6E. Water Law and Institutions

STATE GUIDELINES FOR LOCAL PLANNING IN THE COASTAL AREA UNDER THE COASTAL AREA MANAGEMENT ACT OF 1974.
North Carolina Coastal Resources Commission, Raleigh.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 024, Price codes: A05 in paper copy, A01 in microfiche. Prepared for National Oceanic and Atmospheric Administration, Rockville, MD, 1975. 73 p, 4 fig.

Descriptors: *Land use, *Coasts, *North Carolina, *Local governments, *Planning, Legislation, Management, State governments, Regulation, Land classification, Land development, Resources, *North Carolina Coastal Area Management Act, *Coastal planning, Areas of environmental concern, Environmental management.

This report explains some of the procedures to implement the strong local government role mandated by the North Carolina Coastal Area Management Act (CAMA) of 1974. Local governments include counties and cities. Their role consists of: recommending specific areas that fit the general descriptions of Areas of Environmental Concern (AEC's) contained in these guidelines; developing land use plans and land use regulations for AECs that conform to these guidelines; and implementing the land use plans and regulations within ABC's for developments that are not of greater than local significance. The performance of this role is overseen by the Coastal Resources Commission (CRC). Land use plans for coastal land that is not within an AEC are also reviewed by the CRC, but they cannot enforce implementation of recommended modifications. Land classification plans to guide growth are also required, but implementation of these plans is not required. Each of the local governments' responsibilities cannot be undertaken without full public participation. The report contains both summary information for those interested in monitoring the planning process and detailed information for those responsible for the planning process. (Nessa-NC)
W78-05399

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT: MAIN REPORT.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05400

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT: APPENDIX B - FOUNDATION FOR LEGAL ANALYSIS.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05401

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT. APPENDIX C - FEDERAL AND STATE AGENCY PROFILES.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05402

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT. APPENDIX D; VOLUME I - CASE STUDIES D.1.1 TO D.5.1.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05403

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT, APPENDIX D, VOLUME II, CASE STUDIES D.6.1 TO D.13.1.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05404

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT, APPENDIX D, VOLUME III, CASE STUDIES D.14.1 TO D.22.1.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05405

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT, APPENDIX D, VOLUME IV, CASE STUDIES D.23.1 TO D.29.1.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05406

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT: APPENDIX E--CONSOLIDATED BIBLIOGRAPHY.
Coastal Zone Resources Corp., Wilmington, NC.
For primary bibliographic entry see Field 6B.
W78-05407

SUMMARY REPORT - INSTITUTE IMPROVEMENT WORKSHOP FOR DIRECTORS OF WATER RESOURCES RESEARCH INSTITUTES.
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 9D.
W78-05479

HANDBOOK OF PROCEDURES, CONSTRUCTION GRANTS PROGRAM FOR MUNICIPAL WASTEWATER TREATMENT WORKS.
Environmental Protection Agency, Washington, DC. Office of Water and Hazardous Materials.
For primary bibliographic entry see Field 5D.

W78-05546

MANAGEMENT: SOUTHEAST CONTINENTAL SHELF STUDIES,
Skidaway Inst. of Oceanography, Savannah, GA.
D. W. Menzel.
Available from the National Technical Information Service, Springfield, VA 22161 as SRO-9011, Price codes: A02 in paper copy, A01 in microfiche. Progress Report SRO-901-1, to Energy Research and Development Administration, August 1976. 12 p. 1 fi[illegible]8-1)-901.

Descriptors: *Continental Shelf, *Baseline studies, Water resources, *Water pollution effects, Ocean currents, Ocean circulation, *Management, Southeast US, Path of pollutants, *Outer Continental Shelf, *Southeast US Coast, Gulf Stream.

Progress in the program for coordination of ERDA supported oceanographic research in the Southeast Atlantic area is reported in the following areas: (1) a synthesis of the major scientific conclusions resulting from work in the area; (2) establishment of a Scientific Advisory Committee to assist in program direction and development; (3) establishing liaison between participating scientists through the mechanisms of meeting and data exchange; and (4) coordination of the use of ships and other facilities. The oceanographic program in the Southeast Atlantic currently is comprised of eight elements which may be viewed as follows: a study of physical oceanographic factors forcing water motion on the continental shelf--the origin of Gulf Stream intrusions; the physical oceanography of intrusions once isolated from the Gulf Stream; nutrient fluxes induced by and chemical characterization of intrusions; the effects of intrusions and coastal circulation; microorganisms; phytoplankton and zooplankton; heavy metal distribution and inputs into coastal waters; radioisotope geochemistry; and uptake and discharge of pollutants by marine organisms. (Sinha-OEIS)
W78-05625

A REVIEW OF STATE AGENCIES IMPACTING REGIONAL WATER QUALITY MANAGEMENT.
Miami Valley Regional Planning Commission, Dayton, OH; and Linton and Co., Inc., Washington, DC.
For primary bibliographic entry see Field 5G.
W78-05657

6F. Nonstructural Alternatives

REGIONAL STORM DRAINAGE PLAN, (LEHIGH-NORTHAMPTON JOINT PLANNING COMMISSION).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
August 1975, 155 p, 14 tab, 30 maps, 13 fig, append.

Descriptors: *Storm runoff, *Drainage systems, *Flood control, *Regional development, Storm water, Storm drains, Cities, Urban drainage, Flood plains, Flood protection, Flood plain zoning, Regulation, Watershed management, Economics, Environmental effects, *Pennsylvania, Lehigh County(PA), Northampton County(PA), *Storm drainage.

The plan provides a regional framework and overall coordination scheme for the development of major storm drainage facilities in Lehigh and Northampton Counties. The regional overview was necessary because storm drainage and flood control problems often affect several contiguous municipalities. Storm drainage here relates to the transport of runoff from a municipality to the nearest river or stream; flood control relates to the entire length of the river or stream. In the field of storm drainage, the plan recommends storm sewers in developed areas and retention possibilities in less developed areas. With flood control, non-structual methods--especially floodplain regulation--were emphasized. End products were: both a long-range and short-range program for major storm drainage facilities; recommendations for a floodplain management program; recommendations for plan implementation; and procedures for ongoing plan evaluation. Intermediate products of special interest to local government officials included an in-depth analysis of alternative methods of handling storm runoff which are both environmentally and economically preferred, and an assessment of storm drainage impact on new development. (Zayac-NC)
W78-05397

REGIONAL STORM DRAINAGE PLAN-1977 SUPPLEMENT, (LEHIGH-NORTHAMPTON JOINT PLANNING COMMISSION),
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
A. R. O'Dell.
June 1977, Annual supplement to the JPC Regional Storm Drainage Plan, August 1975. 10 p, 2 tab. 03-00-1092-14.

Descriptors: *Watershed management, *Storm water, *Storm runoff, *Legal aspects, *Legislation, Flood plain insurance, *Pennsylvania, Lehigh County(PA), Northampton County(PA), *Flood plain management, *National Flood Insurance Program, Storm drainage.

This is the most recent annual supplement to the 1975 Regional Storm Drainage Plan. It reports the status of storm drainage and floodplain management efforts in the region during the period July 1976-June 1977. In addition, recent revisions and pending changes to state and federal regulations which deal with stormwater management are presented. Finally, topics which will be considered during the coming year are introduced. (Zayac-NC)
W78-05398

FLOOD PLAIN INFORMATION: MILL CREEK, RIPLEY, WEST VIRGINIA, AND VICINITY.
Army Engineer District, Huntington, WV.
For primary bibliographic entry see Field 4A.
W78-05409

FLOOD PLAIN INFORMATION: OHIO RIVER, POPE AND HARDIN COUNTIES, ILLINOIS.
Army Engineer District, Louisville, KY.
For primary bibliographic entry see Field 4A.
W78-05410

FLOOD PLAIN INFORMATION: OHIO RIVER AND MASSAC CREEK, CITY OF METROPOLIS AND MASSAC COUNTY, ILLINOIS.
Army Engineer District, Louisville, KY.
For primary bibliographic entry see Field 4A.
W78-05411

FLOOD PLAIN INFORMATION: EMBARRAS RIVER AND TRIBUTARIES, CHARLESTON, ILLINOIS.
Army Engineer District, Louisville, KY.
For primary bibliographic entry see Field 4A.
W78-05412

FLOOD PLAIN INFORMATION: SUSSEX COUNTY, VIRGINIA, NOTTOWAY RIVER, VIRGINIA.
Army Engineer District, Norfolk, VA.
For primary bibliographic entry see Field 4A.
W78-05413

FLOOD PLAIN INFORMATION: YELLOWSTONE RIVER, LIVINGSTON, MONTANA.
Army Engineer District, NE.
For primary bibliographic entry see Field 4A.
W78-05414

FLOOD PLAIN INFORMATION: GREAT FALLS, MONTANA, VOLUME II, MISSOURI RIVER.
Army Engineer District, Omaha, NE.
For primary bibliographic entry see Field 4A.
W78-05415

FLOOD PLAIN INFORMATION: BEAVERHEAD RIVER, DILLON, MONTANA.
Army Engineer District, Omaha, NE.
For primary bibliographic entry see Field 4A.
W78-05416

FLOOD HAZARD ANALYSES REPORT: HOCKING RIVER WITH RUSH CREEK, PLEASANT RUN, BLUE VALLEY, BALDWIN RUN, FETTERS RUN, EWING RUN AND TARHE RUN, FAIRFIELD COUNTY, OHIO.
Soil Conservation Service, Columbus, OH.
For primary bibliographic entry see Field 4A.
W78-05417

FLOOD PLAIN INFORMATION: SALT CREEK, KICKAPOO CREEK, BRAINARD BRANCH, AND SALT SPRING BRANCH, LOGAN COUNTY, ILLINOIS.
Army Engineer District, Chicago, IL.
For primary bibliographic entry see Field 4A.
W78-05663

FLOOD PLAIN INFORMATION: MUSKINGHAM DRAW, ODESSA, TEXAS.
Army Engineer District, Fort Worth, TX.
For primary bibliographic entry see Field 4A.
W78-05664

FLOOD PLAIN INFORMATION: LITTLE KANAWHA RIVER, GLENVILLE, WEST VIRGINIA.
Army Engineer District, Huntington, WV.
For primary bibliographic entry see Field 4A.
W78-05665

FLOOD PLAIN INFORMATION: APPOMATTOX RIVER, CHESTERFIELD COUNTY - PETERSBURG, VIRGINIA.
Army Engineer District, Norfolk, VA.
For primary bibliographic entry see Field 4A.
W78-05666

SPECIAL FLOOD HAZARD INFORMATION REPORT: SOUTH PLATTE RIVER, VOLUME 1, WELD COUNTY, COLORADO.
Army Engineer District, Omaha, NB.
For primary bibliographic entry see Field 4A.
W78-05667

FLOOD PLAIN INFORMATION: ALLEGHENY RIVER, MCKEAN COUNTY, PENNSYLVANIA.
Army Engineer District, Pittsburgh, PA.
For primary bibliographic entry see Field 4A.
W78-05668

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME I. RECEPTORS--MAMMALS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977, Environmental Assessment of the Alaskan Continental Shelf, March 1977. 712 p.

Descriptors: *Mammals, *Continental Shelf, *Baseline studies, *Resources development, Ecology, Alaska, *Outer Continental Shelf, Whales, Seals, Sea lions, Balaena mysticetus, Delphinapterus leucas, Phoca vitulina richardi, Erignathus barbatus.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Marine Mammals of the Bering and Southern Chukchi Seas; Seasonal Distribution and Relative Abundance of Marine Mammals in the Gulf of Alaska; Bowhead and Beluga Whales in the Bering, Chukchi and Beaufort Seas, Morbidity and Mortality of Marine Mammals--Bering Sea; Biology of the Harbor Seal in the Gulf of Alaska; the Natural History and Ecology of the Bearded Seal and the Ringed Seal; Trophic Relationships Among Ice Inhabiting Phocid Seals; Population Assessment, Ecology, and Trophic Relationships of Steller Sea Lions in the Gulf of Alaska; The Relationship of Marine Mammal Distributions, Densities and Activities to Sea Ice Conditions; An Updated Assessment of Biological Resources and Their Commercial Importance in the St. George Basin of the Eastern Bering Sea; and A Survey of Cetaceans of Prince William Sound and Adjacent Vicinity. (NOAA)
W78-05206

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME II. RECEPTORS--BIRDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 577 p.

Descriptors: *Baseline studies, *Resources development, *Birds, Ecology, Alaska, Migratory birds, *Outer Continental Shelf, Seabirds, Pribilof Islands.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Identification, Documentation and Delineation of Coastal Migratory Bird Habitat in Alaska; A Census of Seabirds on the Pribilof Islands; Reproductive Ecology, Foods, and Foraging Areas of Seabirds Nesting on the Pribilof; Community Structure, Distribution, and Interrelationships of Marine Birds in the Gulf of Alaska; Shorebird Dependence on Arctic Littoral Habitats; The Distribution, Abundance and Feeding Ecology of birds associated with Pack Ice; Avifaunal Utilization of the Offshore Island Are near Prudhoe Bay, Alaska (NOAA)
W78-05207

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME III. RECEPTORS--BIRDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 641 p.

Descriptors: *Baseline studies, *Resources development, *Birds, Ecology, Alaska, *Outer Continental Shelf, Seabirds, Bering Sea, Gulf of Alaska.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation containsk the following studies: Birds of Coastal Habitats on the South Shore of the Seward Peninsula, Alaska; Ecology and Behavior of Southern Hemisphere Shearwaters (Genus Puffinus) and other Seabirds, when over the Outer Continental Shelf of Bering Sea and Gulf of Alaska during the Northern Summer; Shipboard Surveys of Marine Birds - Part I and Part II; and Catalog of Seabird Colonies. (NOAA)
W78-05208

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME IV. RECEPTORS--BIRDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 762 p.

Descriptors: *Baseline studies, *Resources development, *Birds, Ecology, Alaska, *Outer Continental Shelf, Seabirds, Shorebirds, Gulf of Alaska.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Population Dynamics and Trophic Relationships of Marine Birds in the Gulf of Alaska and Southern Bering Sea, Part I: General Introduction; Part II: Populations and Ecology of Marine Birds on the Semidi Islands; Part III: Breeding Biology of Fulmars at Semidi Islands, Alaska; Part IV: Studies of Marine Birds on Ugaiushak Island; Part V: Studies of Seabird Parasites from Ugaiushak Island, Alaska; Part VI; (not included); Part VII; Dynamics of Marine Bird Populations on the Barren Islands, Alaska; Part VIII: Seabirds on the Wooded Islands, Alaska; Part IX: The Population Ecology and Migration of Seabirds, Shorebirds, and Waterfowl; Part X: Food Habits of Migrant Dunlins and Western Sandpipers; Part XI (not included); Part XII: Avifaunal Assessment of Nelson Lagoon; Part XIII: Field Studies at Cape Peirce, Alaska; and Part XIV: The Trophic Relationships of Marine Birds in the Gulf of Alaska, etc. (NOAA).
W78-05209

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME V. RECEPTORS--BIRDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 454 p.

Descriptors: *Baseline studies, *Resources development, *Water pollution effects, *Birds, Alaska, Ecosystems, Oil pollution, *Outer Continental Shelf, Seabirds, Offshore operations.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Avian Community Ecology at Two Sites on Espenberg Peninsula in Kotzebue Sound, Alaska; Studies of Populations, Community Structure and Ecology of Marine Birds at King Island, Bering Strait Region, Alaska; Avian Community Ecology of the Akulik-Inglutalik River Delta, Norton Bay, Alaska; A Comparative Sea-Cliff Bird Inventory of the Cape Thompson Vicinity, Alaska; Some Aspects of the Ecology of Cliff-Nesting Seabirds at Kongkok Bay, St. Lawrence Island, Alaska, during 1976; and Characterization of Coastal Habitat for Migratory Birds. (NOAA)
W78-05210

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME VI. RECEPTORS--FISH, LITTORAL, BENTHOS,
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 861 p.

Descriptors: *Baseline studies, *Resources development, *Environmental effects, Fish, Littoral zone, Benthos, Bibliographies, Alaska, Continental Shelf, Aquatic animals, *Outer Continental Shelf, Petroleum development, Offshore operations, Life histories.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: The distribution, abundance, diversity and productivity of the western Beaufort Sea benthos; and Summarization of existing literature and unpublished data on the distribution, abundance, and life histories of benthic organisms. (NOAA)
W78-05211

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME VII. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 801 p.

Descriptors: *Baseline studies, *Water pollution effects, *Resources development, Environmental effects, Fish, Shellfish, Aquatic animals, Benthos, Ecosystems, Continental Shelf, Alaska, *Outer Continental Shelf, Petroleum development, Offshore operations.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Alaska Marine Environmental Assessment Project, Herring Spawning Surveys--Southern Bering Sea; Alaska Marine Environmental Assessment Project, Finf-

ish Resource Surveys in Norton Sound and Kotzebue Sound; Razor Clam (Siliqua patula, Dixon) Distribution and Population Assessment Study; An Ecological Assessment of the Littoral Zone along the Outer Coast of the Kenai Peninsula for State of Alaska, Department of Fish and Game; and A Description and Numerical Analysis of the Factors Affecting the Processes of Production in the Gulf of Alaska. (NOAA)
W78-05212

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME VIII. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 829 p.

Descriptors: *Baseline studies, *Resources development, *Water pollution effects, Continental Shelf, Alaska, Fish, Littoral zone, Benthos, *Outer Continental Shelf, Petroleum development, Offshore operations, Gulf of Alaska, Bering Sea, Beaufort Sea.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Baseline/Reconnaissance Characterization, Littorial Biota, Gulf of Alaska and Bering Sea: Baseline Studies of Demersal Resources of the Gulf of Alaska Shelf and Slope: A Historical Review; Baseline Studies of Fish and Shellfish Resources of Norton Sound and the Southeastern Chikchi Sea; Beaufort Sea Estuarine Fishery Study; The Distribution, Abundance, Diversity, and Biology of Benthic Organisms in the Gulf of Alaska and the Bering Sea; Summarization of Existing Literature and Unpublished Data on the Distribution, Abundance, and productivity of Benthic Organisms of the Gulf of Alaska and Bering and Chukchi Seas; Food and Feeding Relationships in the Benthic and Demersal Fishes; and Illustrated Keys to Otoliths of Forage Fishes of the Gulf of Alaska, Bering Sea and Beaufort Sea. (NOAA)
W78-05213

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME IX. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 831 p.

Descriptors: *Baseline studies, *Water pollution effect, *Environmental effects, Fish, Benthos, Plankton, Ecology, Bibliographies, Alaska, *Outer Continental Shelf, Ichthyoplankton, Bering Sea, Beaufort Sea, Chukchi Sea, Offshore operations, Petroleum development.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Literature Search on the Density and Distribution of Fishes of the Beaufort Sea; Reconnaissance Characterization of Littoral Biota, Beaufort and Chukchi Seas; Beaufort Sea Plankton Studies, Ichthyoplankton of the Eastern Bering Sea; and Lower Cook Inlet Meroplankton. (NOAA)
W78-05214

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME X. RECEPTORS--FISH, LITTORAL, BENTHOS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 589 p.

Descriptors: *Baseline studies, *Environmental effects, *Water pollution effects, Alaska, Plankton, Primary biological productivity, Shellfish, Benthos, Ecology, Continental Shelf, Oil pollution, *Outer Continental Shelf, Petroleum development, Offshore operations, Gulf of Alaska, Cook Inlet, Norton Sound.

Report containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Phytoplankton and Primary Productivity in the Northeast Gulf of Alaska and Lower Cook Inlet; Initial Zooplankton Investigations in Prince William Sound, Gulf of Alaska and Lower Cook Inlet; Zooplankton and Micronekton Studies in the Bering - Chukchi/Beaufort Seas; Demesal Fish and Shellfish Assessment in Selected Estuary Systems of Kodiak Island; Distribution of King Crab, Pandalid Shrimp, and Brachyuran Crab Larvae in Kachemak Bay, Alaska, 1972; Trawl Survey of the Benthic Epifauna of the Chukchi Sea and Norton Sound; Pelagic and Demersal Fish Assessment in the Lower Creek Inlet Estuary System; and The Distribution, Abundance and Diversity of the Epifaunal Benthic Organisms in two (Alitak and Ugak) Bays of Kodiak Island Alaska. (NOAA)
W78-05215

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XI. RECEPTORS--MICROBIOLOGY.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 426 p.

Descriptors: *Baseline studies, *Environmental effects, *Water pollution effects, *Microorganisms, *Aquatic microbiology, Alaska, Pollutants, Pathology, Diseases, Plankton, *Outer Continental Shelf, Hydrocarbons, Gulf of Alaska, Cook Inlet, Bering Sea, Petroleum development, Offshore operations.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Assessment of Potential Interactions of Microorganisms and Pollutants Resulting from Petroleum Developmet on the Outer Continental Shelf in the Beaufort Sea; Assessment of Potential Interactions of Microorganisms and Pollutants Resulting from Petroleum Development on the Outer Continental Shelf in the Gulf of Alaska and Cook Inlet: Study of Microbial Activity in the Beaufort Sea and Gulf of Alaska and Analysis of Hydrocarbon Degradation by Psychrophilic Microorganisms; Determine the Frequency and Pathology of Marine Animal Diseases in the Bering Sea, Gulf of Alaska, and Beaufort Sea; and Phytoplankton Studies in the Bering Sea. (NOAA)
W78-05216

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XII. EFFECTS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 826 p.

Descriptors: *Baseline studies, *Water pollution effects, *Oil pollution, *Environmental effects, *Resources development, Alaska, Continental Shelf, Heavy metals, Ecology, Ecosystems, *Outer Continental Shelf, Offshore operations, Petroleum development.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: The physiological Effects of Acute and Chronic Exposure to Hydrocarbons on Near-shore Fishes of the Bering Sea; Lethal and Sublethal Effects on Selected Alaskan Maine Species after Acute and Long-term Exposure to Oil and Oil Components; Sublethal Effects of Petroleum Hydrocarbons and Trace Metals, Including Biotransformations; Ecosystem Dynamics, Eastern Bering Sea; Ecosystem Dynamics Birds and Marine Mammals, Part I and Part II; Effects of Petroleum Exposure on Hatching Success and Incubation Behavior of Glaucous-winged Gulls; Evolution, Pathobiology and Breeding Ecology of the Gulf of Alaska Herring Gull Group; Acute Effects - Pacific Herring Roe in the Gulf of Alaska; Sublethal Effects on Seagrass Photosynthesis; Transport, Retention, and Effects of the Water-Soluble Fraction of Cook Inlet Crude Oil; and Research to Determine the Accumulation of Organic Constituents and Heavy Metals from Petroleum-Impacted Sediments. (See also W78-04443--W78-04456) (NOAA)
W78-05217

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF VOLUME XIII. CONTAMINANT BASELINES.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 861 p.

Descriptors: *Baseline studies, *Water pollution sources, *Resources development, *Heavy metals, Alaska, Continental Shelf, Oil pollution, Sediments, *Outer Continental Shelf, Hydrocarbons, Petroleum development, Offshore operations, Bering Sea, Gulf of Alaska, Beaufort Sea.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from the following studies: Quality Assurance Program for Trace Hydrocarbon Analysis; Research and Evaluation of Trace Element Methodology for the Analysis of Sea Water; The Distribution, Composition and Transport of Suspended Particulate Matter in the Northeastern Gulf of Alaska, Southeastern Bering Shelf and Lower Cook Inlet; Distribution of Light Hydrocarbons in the Northeast Gulf of Alaska, Lower Cook Inlet, Southeastern Chukchi Sea; Submarine Seepage of Natural Gas in Norton Sound, Alaska; Natural Distribution of Trace Heavy Metals and Environmental Background in Alaskan Shelf and Estuarine Areas; Hydrocarbons: Natural Distribution and Dynamics on the Alaskan Outer Continental Shelf; Trace Metal Content of Bottom Sediment in Northern Bering Sea; and Characterization of Organic Matter in Sediments from Gulf of Alaska, Bering and Beau-

fort Seas. (See also W78-04457--W78-04468) (NOAA)
W78-05218

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XIV. TRANSPORT.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 747 p.

Descriptors: *Baseline studies, *Environmental effects, *Resources development, *Ocean currents, Alaska, *Ocean circulation, Deltas, Dispersion, Continental shelf, *Outer Continental Shelf, *Coastal processes, Mesoscale oceanographic processes, Offshore operations, Pollutant transport.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Development and Operation of HF Ocean Current Mapping Radar Units; Surface Currents of the Northeast Chukchi Sea; Current Measurements in Possible Dispersal Regions of the Beaufort Sea; Effects of Seasonability and Variable of Streamflow on Nearshore Coastal Areas; Gulf of Alaska Stufdy of Mesoscale Oceanographic Processes; Numerical Studies of Alaskan Region; Bristol Bay Oceanographic Processes; STD Measurements in Possible Dispersal Regions of the Beaufort Sea; Yukon Delta Coastal processes Study; Lagrangian Surface Current Measurements on the Outer Continental Shelf; and Study of Climatic Effects on Fast Ice Extent and Its Seasonal Decay along the Beaufort Chukchi Coasts. (See also W78-04974--W78-04984) (NOAA)
W78-05219

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XV. TRANSPORT.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 677 p.

Descriptors: *Baseline studies, *Environmental effects, *Ocean currents, *Sea ice, *Water masses, Alaska, Ocean circulation, Climatology, Resources development, *Outer Continental Shelf, Offshore operations, Pollutant transport, Gulf of Alaska, Bering Sea.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Mechanics of Origin of Pressure Ridges, Shear Redges and Hummock Fields in Landfast Ice; Morphology of Beaufort, Chukchi and Bering Seas Near Shore Ice Conditions by Means of Satellite and Aerial Remote Sensing; Experimental Measurements of Sea Ice Failure Stresses Near Grounded Structures; Beaufort Sea, Chukchi Sea, and Bering Strait Baseline Ice Study; Development of Hardware and Procedures for in situ Measurement of Creep in Sea Ice; Operation of an Alaskan Facility for Applications of Remote-sensing Data to OCS Studies; Circulation and Water Masses in the Gulf of Alaska; and Marine Climatology of the Gulf of Alaska, The Bering and Beaufort Seas. (See also W78-04985--W78-04998) (NOAA)
W78-05220

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XVI. HAZARDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 521 p.

Descriptors: *Baseline studies, *Water pollution effects, *Environmental effects, *Oil spills, *Hazards, Alaska, Sedimentation, Sea ice, Geomorphology, Permafrost, Resources development, *Outer Continental Shelf, Offshore operations, Petroleum development, Gulf of Alaska, Beaufort Sea.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Coastal Morphology, Sedimentation and Oil Spill Vulnerability; The Interaction of Oil with Sea Ice in the Arctic Ocean; Dynamics of Near-Shore Ice; Dynamics of Near Shore Ice; The Environmental Geology and Geomorphology of the Gulf of Alaska Coastal Plain and the Coastal Zone of Kotzebue Sound; Delineation and Engineering Characteristics of Permafrost beneath the Beaufort Sea; and Offshore Permafrost Studies, Beaufort Sea. (NOAA)
W78-05221

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XVII. HAZARDS.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 633 p.

Descriptors: *Baseline studies, *Resources development, *Environmental effects, *Hazards, *Alaska, Sea-ice, Permafrost, Water resources, Earthquakes, Foundations, Seismology, Tectonics, *Outer Continental Shelf, Engineering properties, Offshore operations, Petroleum development, Gulf of Alaska, Bering Sea, Beaufort Sea.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Marine Environmental Problems in the Ice Covered Beaufort Sea Shelf and Coastal Regions; Areas of Faulting and Potentially Unstable Sediments in the St. George Basin Region; Earthquake Activity and Ground Shaking in and along the Eastern Gulf of Alaska; Faulting, Instability, Erosion, and Deposition of Shelf Sediments, Eastern Gulf of Alaska; Seismic and Volcanic Risk Studies - Western Gulf of Alaska; Subsea Permafrost: Probing Thermal Regime and Data Analysis; Beaufort Seacoast Permafrost Studies; Benthos-Sedimentary Substrate Interactions; Shallow Faulting, Bottom Instability, and Movement of Sediments in Lower Cook Inlet and Western Gulf of Alaska; and Seismicity of the Beaufort Sea, Bering Sea and Gulf of Alaska. (NOAA)
W78-05222

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XVIII. HAZARDS, DATA MANAGEMENT.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Year Ending March 1977. Environmental Assessment of the Alaskan Continental Shelf, March 1977. 502 p.

Descriptors: *Baseline studies, *Resources development, *Environmental effects, *Hazards, *Alaska, *Data management, Erosion, Sedimentation, Sediment transport, Geomorphology, Tectonics, Seismology, Data processing, Data collections, *Outer Continental Shelf, Offshore operations, Petroleum development.

Reports containing baseline studies are compiled in this annual report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from resources development on the Alaskan Continental Shelf. This compilation contains the following studies: Faulting, Sediment Instability, Erosion, and Depositon Hazards of the Norton Basin Seafloor; Sediment Transport in Norton Sound - Northern Bering Sea, Alaska; Coastal Processes and Morphology of the Bering Sea Coast of Alaska; Seismic and Tectonic Hazards in the Hope Basin and Beaufort Shelf; Seismicity Studies; Alaska OCS Program Coordination; R/V ACONA and Marine Logistics Support; Data File Index/Alaska MEA Program; Data Management/Alaska MEA Program; Bibliographic Support to Principal Investigators; Administrative Support for NODC/OCSEAP Representative and Alaskan Data Processing; Maintenance of Alaskan OCSEAP Surface Marine and Coastal Station Data File; Alaskan Data Processing Facility; and A Geographic Based Information Management System for Permafrost in the Beaufort and Chukchi Seas. (NOAA)
W78-05223

PROCEEDINGS OF THE CONFERENCE ON ASSESSING THE EFFECTS OF POWER-PLANT-INDUCED MORTALITY ON FISH POPULATIONS.
Energy Research and Development Administration, Oak Ridge, TN.; and Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 5C.
W78-05251

QUALITY OF INFERENCE CONCERNING THE EFFECTS OF NUCLEAR POWER PLANTS ON THE ENVIRONMENT,
Washington Univ., Seattle. Center for Quantitative Science in Forestry, Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W78-05262

TECHNICAL REQUIREMENTS AND ANALYSIS METHODS FOR EVALUATING THE ENVIRONMENTAL CONSEQUENCES OF GROUNDWATER CONTAMINATION,
BCS., Inc., Richland, WA.
For primary bibliographic entry see Field 5B.
W78-05372

A GUIDE TO ENVIRONMENTAL PLANNING AND DEVELOPMENT, (LEHIGH-NORTHAMPTON COUNTIES JOINT PLANNING COMMISSION),
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, PA.
For primary bibliographic entry see Field 6B.
W78-05394

STATE GUIDELINES FOR LOCAL PLANNING IN THE COASTAL AREA UNDER THE COASTAL AREA MANAGEMENT ACT OF 1974.
North Carolina Coastal Resources Commission, Raleigh.
For primary bibliographic entry see Field 6E.
W78-05399

ENVIRONMENTAL (IMPACT) ASSESSMENT: DONOHUE-ST. FELICIEN (KRAFT MILL) PROJECT,
Beak Consultants Ltd., Mississauga (Ontario).
For primary bibliographic entry see Field 5C.
W78-05467

ECOSYSTEM IMPACTS OF URBANIZATION ASSESSMENT METHODOLOGY.
Corvallis Environmental Research Lab., OH.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 931, Price codes: A11 in paper copy, A01 in microfiche. Report No. EPA-600/3-76-072, July, 1976, D. L. Jameson, Ed. 227 p, 56 fig, 16 tab, 302 ref, 1 append. 68-01-2642.

Descriptors: *Urbanization, *Ecosystems, Land use, Waste water treatment, Model studies, Analytical techniques, Water pollution effects, *Ecosystem modeling, *Environmental impact statements, Land-use, Analytical descriptor, Woodlands(TX), Lake George(NY).

A methodology, using ecosystem and space-time analysis and modeling, was developed to assess the secondary impacts of urbanization, e.g., waste water treatment, on natural ecosystems. The existing state of the ecosystem is described and emphasizes the dynamic, periodic, trend, and gradient processes, Ecosystem models are used to project land uses and alternatives and their impacts of ecosystems. Incremental and synergistic effects are indicated along with suggested operational adjustments to minimize ecosystem impacts for the recommended project. Ecosystem models are described and the literature on impacts is reviewed. A case study of urbanization at Lake George, NY, emphasizes the usefulness of the components of ecosystem models by linking units from several studies with a new model (Land-use Analytical Descriptor: LAND); a description of the new model is presented. Although there is no comprehensive model that can be used to predict the ecosystem effects of urbanization, there are models which are useful in predicting specific effects from specific perturbations. Thus, a space-time analytical method of exploring potential ecological effects of various aspects of urbanization was developed. A case study of the new town of Woodlands, TX indicates that changes in current methodologies which are required to adopt spact-time analysis and ecosystem modeling to the assessment of the effects of urbanization on the ecosystem. (Seip-IPA)
W78-05533

A PRELIMINARY ASSESSMENT OF THE ENVIRONMENTAL IMPACTS FROM OIL SHALE DEVELOPMENTS,
TRW Environmental Engineering Div., Redondo Beach, CA.
For primary bibliographic entry see Field 5G.
W78-05540

ECOLOGICAL AND AESTHETIC IMPLICATIONS FOR THE MERRIMACK ESTUARY OF THE MERRIMACK BASIN WASTEWATER MANAGEMENT ALTERNATIVES,
Massachusetts Univ., Gloucester, Marine Station.
For primary bibliographic entry see Field 5C.
W78-05554

MARINE ENVIRONMENTAL PROBLEMS IN THE ICE COVERED BEAUFORT SEA SHELF AND COASTAL REGIONS,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05636

FAULTING, SEDIMENT INSTABILITY, EROSION, AND DEPOSITION HAZARDS OF THE NORTON BASIN SEAFLOOR,
Geological Survey. Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05646

SEDIMENT TRANSPORT IN NORTON SOUND - NORTHERN BERING SEA, ALASKA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05647

COASTAL PROCESSES AND MORPHOLOGY OF THE BERING SEA COAST OF ALASKA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05648

SEISMIC AND TECTONIC HAZARDS IN THE HOPE BASIN AND BEAUFORT SHELF,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05649

SEISMICITY STUDIES: (A) NORTHEAST ALASKA AND (B) NORTON AND KOTZEBUE SOUNDS,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W78-05650

DATA MANAGEMENT.
Environmental Research Labs., Boulder, CO.
For primary bibliographic entry see Field 7C.
W78-05651

A STUDY OF THE IMPACT OF THE WETLANDS EASEMENT PROGRAM ON AGRICULTURAL LAND VALUES,
Northern State Coll., Aberdeen, SD. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W78-05652

FINAL REPORT AND RECOMMENDATIONS FOR THE BIG CYPRESS AREA OF CRITICAL STATE CONCERN TO THE STATE OF FLORIDA ADMINISTRATION COMMISSION.
Florida State Dept. of Administration, Tallahassee. Div. of State Planning.
For primary bibliographic entry see Field 5G.
W78-05654

HAWAII COASTAL ZONE MANAGEMENT PROGRAM: TECHNICAL SUPPLEMENT 1. HAWAIIAN COASTAL WATER ECOSYSTEMS: AN ELEMENT PAPER FOR THE HAWAII COASTAL ZONE MANAGEMENT STUDY.
Hawaii Univ., Honolulu.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 336, Price codes: A03 in paper copy, A01 in microfiche. Prepared for National Oceanographic and Atmospheric Administration, Office of Coastal Zone, June 1975, 80 p, 8 tab, 6 fig. Margos, J. F. (editor).

Descriptors: *Coasts, *Ecosystems, *Boundaries(Surfaces), *Hawaii, *Land use, *Management, *Environmental control, Earth-water interfaces, Planning, Environmental effects, Watersheds(Basins), *Coastal zone management.

The general characteristics of the fresh or marine water ecosystems of Hawaii's coastal zone are described. Each of the 25 types of coastal water ecosystems can be placed in inland, shoreline, or offshore categories. The distribution, status, and importance of human derived impacts on each ecosystem type are described. These stresses are used as the criteria for defining the inland boundary for coastal water ecosystem management. The capability of natural ecosystems to perpetuate themselves is distinguished from man's influence on these systems which requires control or management. Since most of man's activities have been detrimental to, or have modified, the ecosystems, the activities must be controlled in order to preserve the functional integrity of the natural ecosystems. The principal sources of human impact on coastal water ecosystems originate on adjacent land areas within the watersheds which drain toward the coast. Hawaii's drainage basins are principally coastal. Thus, most land areas may potentially support activities capable of modifying coastal water ecosystems. As a result, the coastal zone boundary in Hawaii should include all land areas in the islands. (Nessa-NC)
W78-05658

HAWAII COASTAL ZONE MANAGEMENT PROGRAM, TECHNICAL SUPPLEMENT 2. MANAGEMENT OF HAWAII'S COASTAL ZONE FOR WATER QUALITY OBJECTIVES,
Hawaii Univ., Honolulu.
P. H. McGauhey, and L. S. Lau.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 337, Price codes: A04 in paper copy, A01 in microfiche. Prepared for National Oceanographic and Atmospheric Administration, Office of Coastal Zone, August 1975, 47 p, 3 tab, 6 fig.

Descriptors: *Coasts, *Water quality, *Hawaii, *Land use, *Management, Institutions, Environmental effects, Regulation, Boundaries(Surfaces), Economic impact, Water quality control, Water pollution, Waste water disposal, *Waste water management, *Coastal zone management.

An overview of wastewater management as related to the quality of Hawaii's coastal waters is presented. It is intended to be indicative rather than exhaustive. It is intended for planners and interested lay readers. It examines concepts for establishing an inland boundary of the coastal zone, and reflects some of the results of studies made during the course of the 'Quality of Coastal Waters' project. The major coastal features influencing coastal zone management and coastal water quality consideration are described, as are the existing water quality criteria and institutional arrangements. Economic and biological reasons for protecting the coastal water quality are identified. A rational basis for establishing the landward limits of the coastal zone is developed based both on the need to plan and regulate land use planning and regulation will most effectively protect the coastal water quality. The nature of typical waste generating activities are examined. Parameters indicating changes in coastal water quality are identified. Situations affecting coastal water quality are classified and explained according to whether they are manageable or poorly defined. (Nessa-NC)
W78-05659

HAWAII COASTAL ZONE MANAGEMENT PROGRAM, TECHNICAL SUPPLEMENT 4. BEACHES: A COMPONENT OF THE COASTAL ZONE,
Hawaii Inst. of Geophysics, Honolulu.
R. Moberly.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 339, Price codes: A03 in paper copy, A01 in microfiche. Prepared for National Oceanographic and Atmospheric Administration, Office of Coastal Zone August 1975, 36 p, 8 fig.

Descriptors: *Coasts, *Beaches, *Land use, *Management, *Hawaii, Geomorphology, Beach erosion, Littoral drift, Recreation, Seashores, Tidal effects, Access routes, Conservation, Shore protection, *Coastal zone management, Buffers, Sand extraction, Multiple use.

The study describes the beaches along the Hawaiian coasts, examines the benefits of beaches to man, explains the natural processes in which the beach is involved, and reviews the existing literature on beaches. This information is used to evaluate the compatibility of various beach uses, including access, buffer, recreation, and material extraction. These uses are evaluated for conflicts both within the beach system and outside the beach system. Reasonable remedies for each conflict are presented. The use of the beach for access is generally compatible with al other uses. Beaches used for land-sea access should remain in that use. Use of the beach as a buffer conflicts with materials extraction only if sand is removed faster than the ocean replenishes it. The beach protects many valuable coastal properties. Additional research is needed to identify the places where use as a buffer is the beach's highest and best use. Recreation uses frequently conflict with each other and with non-recreation uses; specialized beaches are recommended. Materials extraction conflicts with many uses. A combined envionmental economic, and quality evaluation of alternate sources of sand for construction and for beach restoration is recommended. (Nessa-NC)
W78-05660

HAWAII COASTAL ZONE MANAGEMENT PROGRAM: INUNDATIONS AND FORCES CAUSED BY TSUNAMIS FOR THE STATE OF HAWAII, OBSERVATIONS AND STATISTICAL PREDICTIONS. TECHNICAL SUPPLEMENT NO. 5,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 2L.
W78-05661

HAWAII COASTAL ZONE MANAGEMENT PROGRAM: ENHANCEMENT OF COASTAL ZONE RECREATIONAL OPPORTUNITIES: A DESCRIPTION OF PRESENT COASTAL RECREATIONAL USAGE, CONSTRAINTS, DATA AND RESEARCH POSSIBILITIES IN THE STATE OF HAWAII. TECHNICAL SUPPLEMENT NO. 6,
Hawaii Univ., Honolulu. Dept. of Geography.
For primary bibliographic entry see Field 6B.
W78-05662

7. RESOURCES DATA

7A. Network Design

EVALUATION OF THE NATIONAL ENVIRONMENTAL SPECIMEN BANK SURVEY,
National Bureau of Standards, Washington, DC. Analytical Chemistry Div.
For primary bibliographic entry see Field 5A.
W78-05617

RAINFALL NETWORK SYSTEMS ANALYSIS: THE OPTIMAL ESTIMATION OF TOTAL AREAL STORM DEPTH,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W78-05669

7B. Data Acquisition

ELECTROMAGNETIC WATER CURRENT METER WITH SYNTHETIC DIRECTION FIELD,
V. J. Cushing.
U.S. Patent No. 4,050,301, 9 p, 7 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 962, No 4, p 1481, September 27, 1977.

Descriptors: *Patents, *Currents(Water), Ocean currents, *Current meters, Measurement, Flow measurement, Magnetic studies, Electromagnetic water current meters, Signal generation.

An electromagnetic water current meter includes a transducer driving a signal processor for deriving signals representative of orthogonal flow components of velocity in a known coordinate system, even though the transducer is not fixed relative to the known coordinate system. To effect this, means are provided for generating an artificial field having a predetermined direction relative to the known coordinate system. Sensing means, integral with the transducer, sense orthogonal components of the field. Since the sensing means is integral with the transducer, these components are sensed relative to the unknown coordinate system in which the transducer is oriented. Signal processing means then responds to both the flow signals in the unknown coordinate system to produce flow related signals in the known coordinate system. (Sinha-OEIS)
W78-05234

ANALYSIS OF THE SEASONAL STREAMFLOW VARIATION FOR THE PRIMARY UNREGULATED WATER COURSES IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-05356

ANNUAL REPORT ON THE DEVELOPMENT OF SENSORS AND TECHNIQUES FOR IN SITU WATER QUALITY MONITORING,
Pittsburgh Univ., PA. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 5A.
W78-05362

OPTIMAL SAMPLING AND ANALYSIS USING TWO VARIABLES AND MODELED CROSS-COVARIANCE FUNCTIONS,
North Dakota Univ., Grand Forks, Dept. of Aviation.
For primary bibliographic entry see Field 2B.
W78-05378

AIR-TRUTH LIDAR POLARIZATION STUDIES OF OROGRAPHIC CLOUDS,
Wyoming Univ., Laramie. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 2B.
W78-05382

AUTORUN ANALYSIS OF HYDROLOGIC TIME SERIES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power.
For primary bibliographic entry see Field 2E.
W78-05386

SEASONAL COLOR-INFRARED PHOTOGRAPHS FOR MAPPING INLAND WETLANDS ON U.S. GEOLOGICAL SURVEY 7.5-MINUTE QUADRANGLES,
Geological Survey, Reston, VA. Water Resources Div.; and Geological Survey, Reston, VA. Topographic Div.
V. Carter, and W. R. Stewart.
In: Proceedings of the Fifth Color Aerial Photography Workshop, held in Sioux Falls, South Dakota, August 19-21, 1975: American Society of Photogrammetry, p 143-161, 1975. 7 fig, 18 ref.

Descriptors: *Wetlands, *Mapping, *Aerial photography, *Infrared radiation, *Classification, Remote sensing, Vegetation, Marshes, Swamps, Forests, Water levels, Analytical techniques, Florida, Minnesota, North Carolina, Virginia, Seasonal analysis.

The U.S. Geological Survey has initiated a research project on inland wetland mapping and is experimenting with new compilation methods and map products on three 7.5-minute quadrangles in Florida, Virginia/North Carolina, and Minnesota. Sample products will be evaluated by selected users. Maps are being prepared using existing color infrared (IR) photographs of different scales as overlays on a variety of map bases. Three classification systems are being tested for use in wetland map preparation. Seasonal color IR photographs provide information useful for the separation of vegetative communities. High-water, leaves-off photographs provide the best boundary information in wooded (deciduous) wetlands, facilitating the separation of wetland and forest. Growing-season photographs are necessary to identify and delineate vegetated flats and deep water marshes. (Woodard-USGS)
W78-05424

A STUDY OF MICROWAVE EMISSION PROPERTIES OF SEA ICE - AIDJEX 1972,
Aerojet ElectroSystems Co., Azusa, CA.; and Department of the Environment, Ottawa (Ontario); and Geological Survey, Tacoma, WA. Water Resources Div.
For primary bibliographic entry see Field 2C.
W78-05425

APPLICATION OF THERMAL IMAGERY AND AERIAL PHOTOGRAPHY TO HYDROLOGIC STUDIES OF KARST TERRANE IN MISSOURI,
Geological Survey, Rolla, MO. Water Resources Div.; and Missouri Dept. of Natural Resources, Rolla. Div. of Geology and Land Survey.
For primary bibliographic entry see Field 5G.
W78-05441

A STUDY OF HAWAIIAN WARM RAIN SHOWERS BASED ON AIRCRAFT OBSERVATION,
Hawaii Univ., Hilo. Cloud Physics Observatory.
For primary bibliographic entry see Field 2B.
W78-05582

7C. Evaluation, Processing and Publication

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME XVIII. HAZARDS, DATA MANAGEMENT.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W78-05223

GENERAL PURPOSE COMPUTER-AIDED ANALYSIS AND DESIGN OF TAINTER GATES; VOLUME II, PROCEDURAL MANUAL,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering: and Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8C.
W78-05361

FLOOD PLAIN INFORMATION: MILL CREEK, RIPLEY, WEST VIRGINIA, AND VICINITY.
Army Engineer District, Huntington, WV.
For primary bibliographic entry see Field 4A.
W78-05409

FLOOD PLAIN INFORMATION: OHIO RIVER, POPE AND HARDIN COUNTIES, ILLINOIS.
Army Engineer District, Louisville, KY.
For primary bibliographic entry see Field 4A.
W78-05410

FLOOD PLAIN INFORMATION: OHIO RIVER AND MASSAC CREEK, CITY OF METROPOLIS AND MASSAC COUNTY, ILLINOIS.
Army Engineer District, Louisville, KY.
For primary bibliographic entry see Field 4A.
W78-05411

FLOOD PLAIN INFORMATION: EMBARRAS RIVER AND TRIBUTARIES, CHARLESTON, ILLINOIS.
Army Engineer District, Louisville, KY.
For primary bibliographic entry see Field 4A.
W78-05412

FLOOD PLAIN INFORMATION: SUSSEX COUNTY, VIRGINIA, NOTTOWAY RIVER, VIRGINIA.
Army Engineer District, Norfolk, VA.
For primary bibliographic entry see Field 4A.
W78-05413

FLOOD PLAIN INFORMATION: YELLOWSTONE RIVER, LIVINGSTON, MONTANA.
Army Engineer District, NE.
For primary bibliographic entry see Field 4A.
W78-05414

FLOOD PLAIN INFORMATION: GREAT FALLS, MONTANA, VOLUME II, MISSOURI RIVER.
Army Engineer District, Omaha, NE.
For primary bibliographic entry see Field 4A.
W78-05415

FLOOD PLAIN INFORMATION: BEAVERHEAD RIVER, DILLON, MONTANA.
Army Engineer District, Omaha, NE.
For primary bibliographic entry see Field 4A.
W78-05416

FLOOD HAZARD ANALYSES REPORT: HOCKING RIVER WITH RUSH CREEK, PLEASANT RUN, BLUE VALLEY, BALDWIN RUN, FETTERS RUN, EWING RUN AND TARHE RUN, FAIRFIELD COUNTY, OHIO.
Soil Conservation Service, Columbus, OH.
For primary bibliographic entry see Field 4A.
W78-05417

UNITED STATES GEOLOGICAL SURVEY YEARBOOK, FISCAL YEAR 1977.
Geological Survey, Reston, VA.
For primary bibliographic entry see Field 9D.
W78-05419

SEASONAL COLOR-INFRARED PHOTOGRAPHS FOR MAPPING INLAND WETLANDS ON U.S. GEOLOGICAL SURVEY 7.5-MINUTE QUADRANGLES,
Geological Survey, Reston, VA. Water Resources Div.; and Geological Survey, Reston, VA. Topographic Div.
For primary bibliographic entry see Field 7B.
W78-05424

AVAILABILITY OF GROUND WATER IN SEMINOLE COUNTY AND VICINITY, FLORIDA,
Geological Survey, Orlando, FL. Water Resources Div.
C. H. Tibbals.
Water-Resources Investigations 76-97 (open-file map), 1977. 15 p, 4 sheets, 15 fig, 17 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Groundwater availability, *Water yield, *Water quality, *Florida, Saline water intrusion, Saline water-freshwater interfaces, Chemical analysis, Water wells, Water levels, Groundwater recharge, Groundwater movement, Transmissivity, Potentiometric level, Projections, Seminole County(Fla).

The Floridan aquifer is the most important source of water supply in Seminole County, Fla. Virtually all public and domestic water supplies, industrial supplies, and most of the water used for irrigations are derived from wells that tap the Floridan. In many parts of Seminole County, the Floridan aquifer contains salty water. Since 1965, groundwater use has increased from about 13 mgd to about 34 mgd in 1975 with most of the increase due to increased pumping for public supply. It is estimated that by 1990, ground-water demand will be about 53 mgd and that this demand can be met if wells are located in areas where the thickness of the freshwater section of the aquifer is greatest. Since the 1950's ground-water levels have declined only a few feet and most of the decline is due to deficient rainfall. Ground-water quality has deteriorated only in areas of transition from fresh to salty water. Aquifer transmissivity ranges from about 59,000 sq ft to as low as about 2,000 sq ft. Estimated average annual recharge in Seminole County is 73 mgd. (Woodard-USGS)
W78-05426

DRAINAGE AREAS FOR JEFFERSON COUNTY, ALABAMA,
Geological Survey, Montgomery, AL. Water Resources Div.
J. C. Scott.
Alabama Geological Survey, University, Alabama, Atlas Series 11, 1977. 55 p.

Descriptors: *Maps, *Drainage areas, *Alabama, Water quality, Sampling, Sites, Jefferson County(Ala).

These maps (scale 1:24,000) provide drainage areas for stream basins in Jefferson County, Alabama. The 27 topographic maps show measured drainage areas, in square miles, of the basins contributing to runoff at selected sites along most of the streams. The drainage areas were determined by the U.S. Geological Survey in cooperation with the Geological Survey of Alabama, City of Birmingham and Jefferson County Commission. Sites for which significant stream-discharge data and surface-water quality data are available also are shown on the maps. (Woodard-USGS)
W78-05427

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 1. CENTRAL AND NORTHERN LOUISIANA.
Geological Survey, Baton Rouge, LA. Water Resources Div.
Water-Data Report LA-77-1, December 1977. 405 p, 9 fig.

Descriptors: *Louisiana, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites, Central and northern Louisiana.

Water resources data for the 1977 water year for Louisiana consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report, in three volumes, contains discharge records for 72 gaging stations; stage records for 66 of these gaging stations; stage only for 30 gaging stations; contents for 1 reservoir; stage only for 10 lakes; water quality for 148 stations (27 of these at gaging stations); 215 areal stations, 10 lakes, and 174 wells; and water levels for 696 observation wells. Also included are 199 crest-stage partial-record stations and flood-profile partial-record stations. Additional water data were collected at various sites, not involved in the systematic data-collection program, and are published as miscellaneous measurements. Records for a few pertinent stations in bordering States are also included. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Louisiana. (Woodard-USGS)
W78-05428

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 2. SOUTHERN LOUISIANA.
Geological Survey, Baton Rouge, LA. Water Resources Div.
Water-Data Report LA-77-2, December 1977. 393 p, 13 fig.

Descriptors: *Louisiana, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites, Southern Louisiana.

Water resources data for the 1977 water year for Louisiana consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report, in three volumes, contains discharge records for 72 gaging stations; stage records for 66 of these gaging stations; stage only for 30 gaging stations; contents for 1 reservoir; stage only for 10 lakes; water quality for 148 stations (27 of these at gaging stations); 215 areal stations, 10 lakes, and 174 wells; and water levels for 696 observation wells. Also included are 199 crest-stage partial-record stations and flood-profile partial-record stations. Additional water data were collected at various sites, not involved in the systematic data-collection program, and are published as miscellaneous measurements. Records for a few pertinent stations in bordering States are also included. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Louisiana. (Woodard-USGS)
W78-05429

WATER RESOURCES DATA FOR LOUISIANA, WATER YEAR 1977--VOLUME 3. COASTAL LOUISIANA,
Geological Survey, Baton Rouge, LA. Water Resources Div.
Water-Data Report LA-77-3, December 1977. 578 p, 7 fig.

Descriptors: *Louisiana, *Hydrologic data, *Surface water, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites, Coastal Louisiana.

Water resources data for the 1977 water year for Louisiana consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report, in three volumes, contains discharge records for 72 gaging stations; stage records for 66 of these gaging stations; stage only for 30 gaging stations; contents for 1 reservoir; stage only for 10 lakes; water quality for 148 stations (27 of these at gaging stations); 215 areal stations, 10 lakes, and 174 wells; and water levels for 696 observation wells. Also included are 199 crest-stage partial-record stations and flood-profile partial-record stations. Additional water data were collected at various sites, not involved in the systematic data-collection program, and are published as miscellaneous measurements. Records for a few pertinent sta-

tions in bordering States are also included in this report. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Louisiana. (Woodard-USGS)
W78-05430

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70--PART 16. HAWAII AND OTHER PACIFIC AREAS.
Geological Survey, Reston, VA. Water Resources Div.
Available from the Branch of Distribution USGS, 1200 S. Eads St. Arlington, VA 22202, Price $5.85. Water-Supply Paper 2137, 1977. 750 p, 1 fig.

Descriptors: *Hawaii, *Surface waters, *Basic data collections, *Streamflow, *Lakes, Gaging stations, Flow rates, Average flow, Low flow, Peak discharge, Drainage area, Sites, Crest-stage gages, Reservoir storage, *Pacific Ocean islands, *American Samoa, *Guam, *Trust Territory of Pacific Islands.

This volume of surface water data for Hawaii and other Pacific areas is one of a series of 37 reports presenting records of stage, discharge, and content of streams, lakes, and reservoirs in the United States during the 1966-70 water years. The tables of data include a description of the gaging station, and daily, monthly, and yearly discharges of the stream. The description of the station gives the location, drainage area, records available, type and history of gage, average discharge, extremes of discharge, and general remarks. For most gaging stations on lakes and reservoirs, a description of the station and a monthly summary table of stage and contents are given. Data for partial-record stations include measurements at low-flow partial-record stations and annual maximum stage and discharge at crest-stage stations. (Woodard-USGS)
W78-05431

SUMMARY GROUND-WATER RESOURCES OF LANCASTER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-05432

GROUND-WATER LEVELS IN THE UNITED STATES, 1974. SOUTHEASTERN STATES.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2F.
W78-05433

GROUND-WATER LEVELS IN THE UNITED STATES, 1971-74. NORTHWESTERN STATES.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2F.
W78-05434

GROUND-WATER RESOURCES OF CAMBODIA,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2F.
W78-05435

EVALUATION OF A POTENTIAL WELL FIELD NEAR CHURCH ROCK AS A WATER SUPPLY FOR GALLUP, NEW MEXICO,
Geological Survey, Albuquerque, NM. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-05436

RECONNAISSANCE OF GROUND-WATER RESOURCES IN THE MOUNTAIN HOME PLATEAU AREA, SOUTHWEST IDAHO,
Geological Survey, Boise, ID. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-05438

EVALUATION OF DATA FOR PONDS, LAKES AND RESERVOIRS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 5A.
W78-05483

DEVELOPMENT OF A SYSTEM FOR CONDUCTING INTERLABORATORY TESTS FOR WATER QUALITY AND EFFLUENT MEASUREMENTS,
FMC Corp., San Jose, CA. Advanced Products Div.
For primary bibliographic entry see Field 5A.
W78-05534

THE STATUS OF THE EPA LABORATORY AUTOMATION PROJECT,
Environmental Monitoring and Support Lab., Cincinnati, OH. Physical and Chemical Methods Branch.
For primary bibliographic entry see Field 5G.
W78-05547

A MULTIDIMENSIONAL ANALYSIS OF THE RESULTS OF THE FRENCH 1971 SURFACE WATER QUALITY NETWORK CONTROL IN THE RIVER BASIN 'SEINE-NORMANDIE',
Ecole Nationale Superieure des Mines de Paris, Fontainebleau (France). Center for Geological Information.
For primary bibliographic entry see Field 5A.
W78-05581

CATALOG OF UNITED STATES CONTRIBUTIONS TO THE INTERNATIONAL HYDROLOGICAL DECADE 1965-1974.
National Committee for the International Hydrological Decade, Washington, DC.
For primary bibliographic entry see Field 2A.
W78-05590

EVALUATION OF THE NATIONAL ENVIRONMENTAL SPECIMEN BANK SURVEY,
National Bureau of Standards, Washington, DC. Analytical Chemistry Div.
For primary bibliographic entry see Field 5A.
W78-05617

DATA MANAGEMENT.
Environmental Research Labs., Boulder, CO.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 18. Hazards, Data Management, p 319-498, March 1977.

Descriptors: *Alaska, *Baseline studies, *Data collections, *Data processing, Resources development, Water resources, Water pollution, Environmental effects, Hazards, Data storage and retrieval, *Outer Continental Shelf, *Petroleum development, Environmental conditions, Environmental hazards.

This section of volume 18, of the annual reports of principal investigators, contains brief indicative reports on the management of data pertinent to the baseline studies of the environmental assessment of the Alaskan Continental Shelf. The projects are identified as: Alaska OCS Program Coordination; R/V ACONA and Marine Logistics Support; Data File Index/Alaska MEA Program; Data Management/Alaska MEA Program; Bibliographic Support to Principal Investigators; Administrative Support for NODC/OCSEAP Representative and Alaskan Data Processing; Maintenance of Alaskan OCSEAP Surface Marine and Coastal Station Data File; Alaskan Data Processing Facility; and finally, A Geographic Based Information Management System for Permafrost in the Beaufort and Chukchi Seas. (See also W78-05223) (Sinha-OEIS)
W78-05651

FLOOD PLAIN INFORMATION: SALT CREEK, KICKAPOO CREEK, BRAINARD BRANCH, AND SALT SPRING BRANCH, LOGAN COUNTY, ILLINOIS.
Army Engineer District, Chicago, IL.
For primary bibliographic entry see Field 4A.
W78-05663

FLOOD PLAIN INFORMATION: MUSKINGHAM DRAW, ODESSA, TEXAS.
Army Engineer District, Fort Worth, TX.
For primary bibliographic entry see Field 4A.
W78-05664

FLOOD PLAIN INFORMATION: LITTLE KANAWHA RIVER, GLENVILLE, WEST VIRGINIA.
Army Engineer District, Huntington, WV.
For primary bibliographic entry see Field 4A.
W78-05665

FLOOD PLAIN INFORMATION: APPOMATTOX RIVER, CHESTERFIELD COUNTY - PETERSBURG, VIRGINIA.
Army Engineer District, Norfolk, VA.
For primary bibliographic entry see Field 4A.
W78-05666

SPECIAL FLOOD HAZARD INFORMATION REPORT: SOUTH PLATTE RIVER, VOLUME 1, WELD COUNTY, COLORADO.
Army Engineer District, Omaha, NB.
For primary bibliographic entry see Field 4A.
W78-05667

FLOOD PLAIN INFORMATION: ALLEGHENY RIVER, MCKEAN COUNTY, PENNSYLVANIA.
Army Engineer District, Pittsburgh, PA.
For primary bibliographic entry see Field 4A.
W78-05668

WATER QUALITY DATA STORAGE AND RETRIEVAL,
Environmental Health Lab. Kelly AFB, TX.
For primary bibliographic entry see Field 5A.
W78-05676

MODIFICATIONS OF ORNL'S COMPUTER PROGRAMS MSF-21 AND VTE-21 FOR THE EVALUATION AND RAPID OPTIMIZATION OF MULTISTAGE FLASH AND VERTICAL TUBE EVAPORATORS,
Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 3A.
W78-05692

8. ENGINEERING WORKS

8B. Hydraulics

FLOATING WAVE BARRIER,
W. W. Bowley.
U.S. Patent No. 4,048,802, 11 p, 10 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 962, No 3, p 994, September 20, 1977.

Descriptors: *Patents, *Shore protection, *Breakwaters, *Coastal structures, Ocean waves, Waves(Water).

The floating wave barrier comprises at least one vessel having a top, walls and a bottom which, when placed in water, has the bottom submerged. The vessel or vessels, when placed in water, contain a gas and water. When several vessels are employed, they are connected with at least one flexible line or rigid connection and the top vessel is connected to an anchor on the sea bottom so that when the barrier is placed in water, the vessels are positioned at different vertical levels, with the top member being at or near the surface of the water. The remaining vessels are submerged but near the water surface so that they are located within the top portion of the wave where the major portion of the wave energy is encountered. When placed in water, the vessels are fixed to prevent substantial movement in the horizontal direction but are free to oscillate around its axis of pitch. The barriers are arranged parallel to the shore being protected at varying distances from the shore so that a given portion of the wave contacts more than one barrier prior to reaching the shore. (Sinha - OEIS)
W78-05228

WAVE FORCES ON SUBMERGED PIPELINES-A REVIEW WITH DESIGN AIDS,
Naval Construction Battalion Center, Port Hueneme, CA. Civil Engineering Lab.
D. A. Davis, and J. B. Ciani.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A028 620, Price codes: A04 in paper copy, A01 in microfiche. Technical Report R 844, July 1976. 57 p, 3 tab, 5 fig, 103 ref, 1 append. YF53.534.001.01.022.

Descriptors: *Pipelines, *Design data, *Wave(Water), Design, Hydrodynamics, Drag, Reviews, Publications, Equations, Testing, Graphical analysis, *Wave forces, *Ocean structures, *Submerged pipelines, Lift, Inertia.

The literature on the subject of wave forces on pipelines were reviewed. Interim design procedures, which include force equations incorporating inertia, drag, and lift components, were presented. Also presented were design aids for determining appropriate values of force coefficients. Three classes of pipeline problems were addressed: (1) pipelines remote from the seafloor, (2) pipelines in contact with the seafloor, and (3) pipelines near enough to the seafloor to be influenced by the boundary effects. It was recommended that these design procedures and aids be used until more data are available. Recommendations for future tests also were ade. (Adams-ISWS)
W78-05364

LOCALISED DESTRATIFICATION OF LARGE RESERVOIRS TO CONTROL DISCHARGE TEMPERATURES,
Victoria State Rivers and Water Supply Commission, Melbourne (Australia).
F. L. Burns.
Progress in Water Technology, Vol. 9, No. 1, p 53-63, 1977. 7 fig, 7 ref.

Descriptors: *Destratification, *Reservoirs, *Mixing, *Australia, Model studies, Hydraulic models, On-site investigations, Temperature, Water temperature, Dissolved oxygen, Jets, Aeration, Water quality, Rivers, Lakes, Dams, Limnology, Pre-impoundment, *Dartmouth Dam(Australia).

Temperature stratification occurs in many Victorian reservoirs in summer, resulting in water temperatures of up to 24C in the upper layers and down to 9C in the lower layers. For reservoirs having outlets only in this cold water region, the temperatures of summer releases to the river, therefore, may be well below normal summer river temperatures. This may have ecological effects on the river unless provision is made for breaking up the stratification or installing higher outlets. This paper described an investigation involving hydraulic model studies, using salt solutions to reproduce stratification and supported by full-scale field tests, to develop a destratification installation for he 180 m deep, 4,000,000 Ml capacity Dartmouth dam at present under construction on the Mitta Mitta river in Victoria. A model scale relationship was developed for artificial aeration, and, using this together with the Froude model relationship for water jets, an effective system was developed for producing local destratification in the vicinity of the outlets at Dartmouth. The model results indicated that a combined system of aeration and high-energy water jets will produce substantial increases in the temperature of water releases from the 60 m deep outlet. They also indicated that large outflows from the outlet will assist in this destratification action. (Sims-ISWS)
W78-05370

HYDRODYNAMICS OF BUBBLE PLUMES AND OXYGEN ABSORPTION IN STRATIFIED IMPOUNDMENTS,
College of Petroleum and Minerals, Dharan (Saudi Arabia). Dept. of Civil Engineering.
F. Rayyan, and R. E. Speece.
Progress in Water Technology, Vol. 9, No. 1, p 129-142, 1977. 11 fig, 3 tab, 10 ref.

Descriptors: *Reservoirs, *Georgia, *Dissolved oxygen, *Bubbles, *Model studies, Mathematical models, Laboratory tests, On-site investigations, Stratification, Thermal stratification, Fisheries, Stream fisheries, Trout, Hypolimnion, Oxygen, Absorption, Lakes, Rivers, *Clark Hill Reservoir(Augusta Ga), Bubble plumes.

Deep impoundments seasonally stratify. The penstock intake normally withdraws colder water from the hypolimnion. The downstream region, therefore, is classified as a trout fishery with six mg/l of dissolved oxygen (DO) specified by the water quality regulatory agencies. Algal growth in the surface waters and subsequent decay in the hypolimnion often deplete the DO within the hypolimnion by September each season. Consequently, tailrace DO diminishes as the stratification season progresses. It was determined that an unconfined oxygen bubble plume, rising freely through the hypolimnion, is a simple and effective oxygen absorption system for in-place hypolimnion oxygenation. This paper was directed toward the development of equations which describe the hydrodynamic behavior was calibrated initially using a very well controlled laboratory system. The water column stratification was achieved by very carefully adding successive layers of water at the desired temperature to the tank. Thermistors at 5 desired levels were suspended from an automatic traversing bridge which continuously traversed the bubble plume with the output recorded on punched tape. The predicted and observed results agreed within a maximum error of 10%. This agreement was deemed sufficiently close to subsequently use the model to design a full-scale hypolimnion oxygenation system for Clark Hill Reservoir near Augusta, Georgia. (Sims-ISWS)
W78-05371

PERTURBATION SOLUTION OF SPATIALLY VARIED FLOW IN OPEN CHANNELS,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
M. A. Gill.
Journal of Hydraulic Research, Vol 15, No 4, p 337-350, 1977. 7 fig, 2 tab, 7 ref, 2 append.

Descriptors: *Open channel flow, *Analytical techniques, *Subcritical flow, *Model studies, *Hydraulics, Steady flow, Flow resistance, Gradually varied flow, Froude number, Darcy-Weisbach equation, Regime, Equations, *Spatially varied flow, Perturbation solution, Mixed flow regime.

Approximate algebraic solutions were developed using the method of perturbation for spatially varied flow in open channels. The predictions from algebraic solutions are sufficiently accurate for subcritical flows in the range of y sub u = 0.5 to 1.1 where y sub u is the dimensionless depth at the upstream end. Algebraic results also were obtained for mixed flow regime. In the supercritical subregime of the mixed regime flow, the predictions are as accurate as the earlier numerical results given by Li. Analytical results also were produced taking hydraulic friction into account. Experimental results were presented in support of the analytical equations for subcritical regime. The fact that hydraulic friction is increased appreciably in spatially varied flows as noted in some earlier studies was confirmed. (Singh-ISWS)
W78-05389

TRANSVERSE MIXING IN MEANDERING CHANNELS WITH VARYING BOTTOM TOPOGRAPHY,
Canada Centre for Inland Waters, Burlington (Ontario). Hydraulics Research Div.
For primary bibliographic entry see Field 5B.
W78-05390

STRATIFICATION AND OPEN CHANNEL FLOW,
Vanderbilt Univ., Nashville. TN. Dept. of Environmental Engineering and Policy Management.
R. H. French.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 104, No HY1, Proceedings Paper 13458, p 21-31, January 1978. 9 fig, 2 tab, 5 ref, 2 append. NSF GI34932.

Descriptors: *Open channel flow, *Stratified flow, *Laboratory tests, *Theoretical analysis, Stratification, Density stratification, Roughness(Hydraulic), Flow resistance, Flow, Hydraulic models, Mathematical models, Mathematical studies, Analysis, Velocity, Profiles, Hydraulics, Open channels.

The effect of density stratification on the vertical velocity profile in turbulent open channel flow was examined. Using the Monin-Obukov length scale and Prandtl mixing length theory, equations reflective of the effect of stratification were derived, and the theory was extended to estimate values of the bottom boundary friction factor. Laboratory data were used to confirm the basic hypotheses. The results indicated that density stratification can modify significantly the shape of the vertical velocity profile and the value of the friction factor. (Humphreys-ISWS)
W78-05566

TRANSVERSE BED SLOPES IN CURVED ALLUVIAL STREAMS,
Karlsruhe Univ. (West Germany). Inst. fuer Hydromechanik.
C. Zimmermann, and J. F. Kennedy.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 104, No. HY1, Proceedings Paper 13482, p 33-48, January 1978. 5 fig, 1 tab, 23 ref, 2 append.

Descriptors: *Sedimentation, *Slopes, *Beds, *Streams, Open channel flow, Rivers, Sedimentation rates, Open channels, Hydraulics, Curves, Equations, *Secondary flow, Bed forms, Channel geometry, Bed particles.

Forty-nine experiments were conducted in three different constant radius, erodible bed, curved flumes using two different sediments to investigate the relationship between channel geometry, flow and sediment properties, and bed topography. An analytcial model based on moment equilibrium of the flow and force equilibrium of

the bed particles was used to develop and equation for the mean radial bed slope in terms of the friction factor, flow depth and velocity, channel radius, and particle densimetric Froude number. The relation was found to be in good agreement with reported experimental data and with bed topography measured by Hooke in a sinuous channel. (Lee-ISWS)
W78-05567

EFFECT OF CHANNEL MEANDERS ON FLOOD STAGE IN VALLEY,
Saskatchewan Univ., Saskatoon. Dept. of Civil Engineering.
C. D. Smith.
Journal of the Hydraulics Division, American Society of Civil Engineering, Vol. 104, No. HY1, Proceedings Paper 13497, p 49-58, Janùary 1978. 8 fig, 3 tab, 3 ref, 2 append.

Descriptors: *Flood stages, *Meanders, *Channels, *Valleys, Open channel flow, Open channels, Hydraulics, Effects, Mathematical models, Equations, *Meandering streams, Overbank flow.

Results of this study indicated that for a meandering channel in a valley there is an interaction between the channel flow and valley flow. The nature of the interaction varies with stage in that channel flow remains dominant when the overbank flow is relatively shallow, but may become insignificant when the overbank flow is deep. Once the valley flow becomes dominant, the presence of the meandering chennel can produce greater stages than would occur if the channel were absent. The tests showed that the method recommended for straight channels with irreglar cross sections applies with good accuracy, but that it would be not totally erroneous to apply this method to a meandering channel in a valley. Although not tested, there is little doubt that the effects noted for a sinusoidal channel would be even more pronounced for a channel with a convoluted meander pattern. (Lee-ISWS)
W78-05568

TEMPERATURE AND MISSOURI RIVER STAGES NEAR OMAHA,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-05569

THEORETICAL ESTIMATIONS OF FLOOD ROUTING PARAMETERS,
Northeastern Univ., Boston, MA. Dept. of Civil Engineers.
A. D. Koussis.
Journal of the Hydraulics Division, American Society of Civil Engineers, Technical Note, Vol. 104, No. HY1, p 109-115, January 1978. 3 fig, 1 tab, 4 ref, 1 append.

Descriptors: *Flood routing, *Open channel flow, *Model studies, *Hydrographs, Floods, Hydraulics, Analytical techniques, Theoretical analysis, Discharge(Water), Flood waves, Open channels, Flow characteristics, Rating curves, Flood stages, Mathematical models, Model calibration, Kalinin-Miljukov method, Flood routing parameters.

Theoretical expressions for flood routing parameters were derived and modified to apply to the case of floods, based on the fact that the basic equations of the approximate methods lead to a convection-diffusion equation. The reliability of these expressions was checked by comparing theoretically estimated parameter values with the optimal ones obtained from flood records. In addition, an actual flood was routed through a short reach of the Rhine river using theoretically estimated parameters. The computed hydrographs were found to be in satisfactory agreement with the field observations. These results indicated that estimates derived from the foregoing expressions are sufficiently accurate to predict performance of preliminary channel designs. The expressions were derived assuming single-valued rating curves. Therefore, rapidly rising floods resulting in a noticeable difference between steady flow profiles and flood profiles have to be treated by more sophisticated methods that take into account the existence of loop-shaped rating curves. Dealing with significant lateral inflows (backwater effects) requires the application of the full governing equations. (Humphreys-ISWS)
W78-05572

HIGHWAYS IN THE RIVER ENVIRONMENT--HYDRAULIC AND ENVIRONMENTAL DESIGN CONSIDERATIONS, BASIC COURSE, INSTRUCTOR'S LESSON PLANS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
E. V. Richardson, S. Karaki, K. Mahmood, D. B. Simons, and M. A. Stevens.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 089, Price codes: A07 in paper copy, A01 in microfiche. Report No. FHWA-NHI-76-N004, August 1975. 120 p, 6 tab, 2 append. DOT-FH-11-8101.

Descriptors: Publications, *Open channel flow, *Sediment transport, *Bank protection, *Environmental effects, *Road construction, *Bridge construction, Embankments, Geomorphology, Hydraulic engineering, Highways, Training, Education, Engineering education, *Short courses, Causeways, Instructional materials.

Through a coordinated effort between the Federal Highway Administration and Colorado State University, a course was developed to provide training in the practical application of the concepts of open channel flow, fluvial geomorphology, and river mechanics for the planning, location, design, construction, maintenance and operation of highways and to enable the participants to apply these concepts to environmental problems associated with highway crossings and encroachments. This two-week course was oriented to graduate engineers who have had training in basic hydraulics. There are outlines for each of the thirty-four lessons for the course. A lesson may consist of only a lecture, or it may have a lecture, problems, and discussion session. Each lesson is a unit by itself with specific objectives. (Adams-ISWS)
W78-05585

A BAYESIAN APPROACH TO MULTIVARIATE HYDROLOGIC SYNTHESIS,
Massachusetts Inst. of Tech., Cambridge Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
J. B. Valdes, I. Rodriguez-Iturbe, and G. J. Vicens.
Available from the National Technical Information Service Springfield, VA 22161 as PB-261 575, Price codes: A07 in paper copy, A01 in microfiche. Report No. 201, June 1975. 127 p, 7 fig, 4 tab, 45 ref, 3 append. GK-416443X.

Descriptors: *Synthetic hydrology, *Markov processes, Analytical techniques, *Methodology, Risks, Regression analysis, Entropy, Hydrology, Model studies, *Bayesian approach, *Synthetic generation, Augmented data, Multivariate model.

A Bayesian multivariate autoregressive model for the synthetic generation of hydrologic traces was presented. The model explicitly accounts for the uncertainty existing in the estimation of the parameters of the model due to the finite size of historic sample in addition to the natural uncertainty in the hydrologic variables. The model was applied for the synthetic generation of three rivers in related basins, and the synthetic sample moments were compared with those of the historic records. Traditional and Bayesian models for data augmentation were discussed. Both types of models were applied to two very different rivers and their results were discussed. Current methods of model comparison were presented, and the need for newer criteria for the selection of stochastic models was discussed. The use of the entropy function, as defined in information theory, was explored, and several simulation runs were made to evaluate further this criteria. (Singh-ISWS)
W78-05586

HYDROLOGICAL FIELD INVESTIGATIONS FOR DESIGNING HYDROELECTRIC POWER-PLANTS,
For primary bibliographic entry see Field 8C.
W78-05593

EVALUATION OF FLOOD RISK FACTORS IN THE DESIGN OF HIGHWAY STREAM CROSSINGS. VOL III. FINITE ELEMENT MODEL FOR BRIDGE BACKWATER COMPUTATION,
Water Resources Engineers, Springfield, VA.
M. T. Tseng.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 960, Price codes: A09 in paper copy, A01 in microfiche. Report FHWA-RD-75-53, April 1975. 20 fig, 10 tab, 27 ref, 1 append.

Descriptors: *Mississippi, *Flow profiles, *Finite element analysis, *Numerical analysis, Continuity equation, Equations, Momentum equation, Bridge design, Hydraulics, Backwater, Flood flow, Computer models, *Risks, *Galerkin process, *Tallahalla Creek(Miss).

A mathematical model describing the steady, two-dimensional subcritical flow in wide, heavily vegetated flood plains of bridge waterways was developed using the finite element method of numerical analysis. The basic fluid equations comprising the model consist of the phenomenologic motion equations and the continuity equation, which are solved simultaneously by numerical methods to yield the spatial distribution of water surface elevations and velocities within the flow region for prescribing boundary conditions. The model simulates flow characteristics of arbitrary geometry. Hydraulic computations for various highway stream crossing orientations can be performed by the model. The model also simulates flow overtopping roadway embankments and performs hydraulic computations for a series of bridges across a stream valley without requiring prior assumption of the flow distribution for each bridge opening. The model was tested for two example problems: (1) a field site near Laurel, Mississippi, and (2) hydraulic flume data. In both examples good agreement between the model and the observed data was demonstrated. The other volumes of this study are: I. Experimental Determination of Channel Resistance for Large Sclae Roughness; II. Analysis of Bridge Backwater Experiments; IV. Economic Risk Analysis for Design of Bridge Waterways; and V. Data Report for Spur Dike Experiment. (See also W78-00699 and W76-10452) (Lardner-ISWS)
W78-05596

MATHEMATICAL MODELING OF SHORELINE EVOLUTION,
Tetra Tech, Inc., Pasadena, CA.
For primary bibliographic entry see Field 2L.
W78-05626

HAWAII COASTAL ZONE MANAGEMENT PROGRAM: INUNDATIONS AND FORCES CAUSED BY TSUNAMIS FOR THE STATE OF HAWAII, OBSERVATIONS AND STATISTICAL PREDICTIONS. TECHNICAL SUPPLEMENT NO. 5,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 2L.

W78-05661

8C. Hydraulic Machinery

SYSTEM FOR GENERATING POWER FROM WAVE MOTIONS OF THE SEA,
Insituform (Pipes and Structures) Ltd., (England). (Assignee).
E. Wood.
U.S. Patent No. 4,048,512, 12 p, 16 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 962, No 2 p 875, September 13, 1977.

Descriptors: *Patents, *Waves(Water), Ocean waves, Energy, Energy transfer, Energy conversion, Electric power production, Coastal structures.

A system for generating power from wave motions of the sea suggests a prime mover essentially floated on the sea but which has freedom only to rock about a defined axis, the principle being that the energy is derived from this rocking motion. The prime mover has been referred to as a 'duck' for the bobbing motion it executes. The invention provides a power generating system for the generation of energy from the wave motions of the sea and which is buoyantly supported by the sea in use comprising spine elements defining a spine on which ducks are rockably mounted. The system further includes tension cables pressing the spine elements towards each other to define the spine and energy conversion means for converting the rocking motions of the ducks in to a form which can be transmitted from the system. (Sinha - OEIS)
W78-05226

PROCESS AND DEVICE FOR HARNESSING WAVE ENERGY,
M. G. Tornabene.
U.S. Patent No. 4,048,801, 6 p, 6 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 962, No 3, p 994, September 20, 1977.

Descriptors: *Patents, *Waves(Water), Energy conversion, Energy transfer, Engineering structures, Floating.

Spherical float elements are mounted on levers which are each mounted for reciprocation along elongated axes substantially vertical to the sea bottom with interconnected drive shafts for mutually contributing to a common drive. They are arranged relative to one another and relative to a direction of wave movement so that energy in the form of water pressure waves above and below the water surface are deflected from the forward float elements to the rearward elements to impel against the rearward elements together with the impelling of the normal waves or residual waves also impelling against each of forward and rearward waves, and the process of arranging the spherical float elements harnesses the deflected energy. (Sinha - OEIS)
W78-05227

APPARATUS FOR EXTRACTING WATER FROM THE ATMOSPHERE,
Firma Technico Development and Financing S.A., Fribourg (Switzerland). (Assignee).
W. Mehnert.
U.S. Patent No. 4,050,262, 8 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 962, No 4, p 1467, September 27, 1977.

Descriptors: *Patents, *Meteoric water, Atmosphere, Water vapor, Heat pumps, Distillation, Condensation, Equipment, Dehumidifiers, Portable.

A portable apparatus is provided for the extraction of water from the atmosphere. A heat pump driven by means of a prime mover or by hand, cooperates with one or two chamber systems through a valve. In the instance where one chamber is used, the chamber is connected to the heat extraction side of the heat pump. Where two chambers are used these chambers are alternately connected through a multi-way valve to the heat extraction side of the heat pump. The heat pump may operate by freezing, as well as by condensation, whereby the chamber systems generally are connected to the low pressure side of the heat pump. Each chamber system is provided with a suction fan or with a compressor. In a simple manner an apparatus is provided which sucks in the air of its environment to expand and cool the air whereby the latter releases its humidity at the strongly cooled surface of the vaporizer plates being cooled by the heat pump. The operation is such that depending on an operating characteristic in the evaporation chamber, a switch-over takes place from evaporation to liquification and vice versa. Where two chambers are employed an alternating switch-over between vaporization and liquification is performed. The output will depend on the prevailing humidity in the atmosphere. (Sinha-OEIS)
W78-05233

MULTIPLE-COMPLETION GEOTHERMAL ENERGY PRODUCTION SYSTEMS,
A. T. van Huisen.
U.S. Patent No. 4,051,667, 9 p, 6 fig, 1 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 963, No 1, p 48, October 4, 1977.

Descriptors: *Patents, *Geothermal studies, *Geophysics, *Borehole geophysics, Heat flow, Convection, Thermal properties, Heat exchangers, Steam, Thermal powerplants.

A system for the mining of geothermal energy is described in which a number of geothermal wells radiate from a single surface site into a subsurface geothermal reservoir. The wells can be drilled by conventional slant drilling techniques and each may contain a closed end heat exchanger which receives water and generates steam. Some of the heat exchangers are places vertically and others are implanted horizontally. By alternating production of the wells in a programmed cyclical manner, convective movement of the hydrothermal fluid will occur within the geothermal zone. The generated steam is collected in a reservoir at the surface site and utilized to generate electricity. The condensate from the turbine can be recycled to the wells. (Sinha - OEIS)
W78-05240

GENERAL PURPOSE COMPUTER-AIDED ANALYSIS AND DESIGN OF TAINTER GATES; VOLUME II, PROCEDURAL MANUAL,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering: and Army Engineer Waterways Experiment Station, Vicksburg, MS.
I. Z. Emkin.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 938, Price codes: A12 in paper copy, A01 in microfiche. Contract Report K-76-1, August 1976. 255 p, 12 fig, 14 tab, 11 ref, 9 append. DACW39-76-M-0869,DACW39-76-M-2230.

Descriptors: *Radial gates, *Structural analysis, *Computer programs, *Loads(Forces), *Structural members, Hydraulic structures, Design, Gates, Structural design, Stress, Gate design, STRUDL.

A step-by-step procedure was presented for analyzing and designing tainter gate hydraulic structures by a general purpose, structural analysis, and design computer system. The ICES STRUDL II computer program that has all the necessary characteristics to perform the analysis and design. The method considers the effects of the hoisting cables, side seal friction, trunnion pin friction, and sidesway constraint limit. The STRUDL approach described herein is arranged for maximum utility of the approach in a design office environment. The use of the FASTDRAW/2 interactive graphics system also was described in step-by-step detail. FASTDRAW/2 proves to be useful for displaying three-dimensional views of the tainter gate structure geometry for final check purposes but is not as useful for tainter gate geometry creation. (Adams-ISWS)
W78-05361

HYDROLOGICAL FIELD INVESTIGATIONS FOR DESIGNING HYDROELECTRIC POWER-PLANTS,
Ya. L. Gotlib, I. A. Kuz'min, F. F. Razzorenov, and Sokol'nikov.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 729, Price codes: A14 in paper copy, A01 in microfiche. Publication No. TT 74-52003 Amerind Publishing Co. Pvt. Ltd, New Delhi (India). 1976. 302 p. Translated from Naturnye Gidrologicheskie Issledovaniya Pri Proektirovanii GES, 1971.

Descriptors: *Hydroelectric plants, *Hydrologic aspects, *On-site investigations, *Hydraulics, *Publications, Channel flow, Sedimentation, Reservoir storage, Water temperature, Tailwater, River flow, Rivers, Discharge(Water), Measurement, Evaluation, Analysis, Analytical techniques, Model studies, Ice cover, Diversion, Velocity, Operations, Flow, Meanders, Design, Sediment transport, Design data, Deposition(Sediments), Reservoirs, Ice, Thermal properties, Ice jams, Construction, Backwater, Floods, Foreign research, *USSR.

This book deals with the problems of full-scale hydrological field investigations made in the course of designing, construction, and operation of hydroelectric power stations. Utilizing the experience gained from the full-scale field investigations made during the design of a large number of hydroelectric stations, an attempt has been made to generalize the results of these investigations and to show what the content of hydraulics, channel flow, and ice and thermal regimes of flow investigations must be and what their requirements are. Since a large number of examples were cited during the course of description and since many of the problems given were based on the material derived from field investigations, this work, to a certain extent, throws light upon the flow regimes under natural conditions, during the process of construction and during operation of the hydroelectric stations at the upper and lower reaches of the installations. (Humphreys-ISWS)
W78-05593

WAVE-PUMP APPARATUS,
O. H. Andrews.
U.S. Patent No. 4,040,257, 6 p, 3 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 961, No 2, p 529, August 9, 1977.

Descriptors: *Patents, *Waves(Water), *Currents(Water), *Water circulation, Pumping, Coastal structures, Water conveyances, Equipment.

This invention relates to a means for pumping water from large bodies of water and depositing it in a remote area, or more particularly, relates to a wave-pump apparatus positioned along coastal waters having substantially continuous wave action so that the force of the waves creates a moving force within the apparatus for continuous water flow. The invention is designed to capture each incoming wave of water within its structure so that the force generated by each succeeding wave moves the continuous flow of water through the apparatus and then discharges it at a predetermined point. The apparatus comprises a housing having a funnel-lide mouth entrance which receives the initial wave. The wave is constricted as it is channeled through a flap-valve gate, allowing the water to enter into a throat portion. As the

wave passes through the throat portion, the flap-valve closess-preventing back-flow before the next wave reaches the valve gate. From this point, the continuous rush of ingressing water into the throat causes the previously captured water to be forced through the throat and into an adjacent water tower defining a conduit. (Sinha - OEIS)
W78-05597

DREDGING SYSTEM AND METHODS OF DREDGING,
L. N. Smith.
U.S. Patent No. 4,052,801, 10 p, 11 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 963, No 2, p 422, October 11, 1977.

Descriptors: *Patents, *Dredging, *Excavation, *Underwater, Channel improvement, Aquatic soils, Earth handling equipment, Disc cutterhead.

This invention provides an underwater dredging apparatus for difficult-to-excavate materials wherein a rotary disc cutter is connected to a dredge pump in a manner which will permit it to be power turned end-for-end in 90 degree steps separated by a lowering step so that it may be employed to cut or excavate material on a continuous basis. The apparatus and method for excavating material such as marl from an underwater basin employes a disc-type cutterhead provided as the front wall of a material collecting compartment which connects with a slurry removing suction pipe. The cutterhead is movable 180 degrees about a longitudinal axis transverse to the axis of disc rotation and the disc incorporates pump means which 'supercharge' the suction pump normally carried on the dredging vessel. (Sinha-OEIS)
W78-05603

APPARATUS FOR REMOVING PARTICLES FROM WATER FOR SPRINKLERS AND THE LIKE,
For primary bibliographic entry see Field 3F.
W78-05610

8D. Soil Mechanics

LIQUEFACTION POTENTIAL OF DAMS AND FOUNDATIONS; REPORT 2, LABORATORY STANDARD PENETRATION TESTS ON PLATTE RIVER SAND AND STANDARD CONCRETE SAND,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavements Lab.
W. A. Bieganousky, and W. F. Marcuson, III.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A039 828, Price codes: A05 in paper copy, A01 in microfiche. Research Report S-76-2, February 1977. 87 p, 23 fig, 10 tab, 6 plate, 13 ref, 2 append.

Descriptors: Dams, *Dam foundations, *Failures, *Laboratory tests, Penetration, *Sands, Bulk density, Soil tests, Curves, Overburden, Soil pressure, Statistical methods, Correlation analysis, Uniformity coefficient, Testing, Equipment, Consolidation, Sieve analysis, Submergence, Colorado, *Platte River(Colo), *Liquefaction(Soils), *Standard penetration tests, Relative density, In situ tests, Standard concrete sand.

The Standard Penetration Test (SPT) was examined critically with respect to its ability to estimate relative density in situ. Six test specimens, 4 ft in diameter by 6 ft high, were constructed using Platte River sand and Standard Concrete sand. SPT's were performed, using field drilling equipment, on specimens under 3 overburden pressures and constructed to 3 relative densities. The results were presented as a family of curves correlating relative density with SPT N-values at the 3 overburden pressures. This research is an extension of a previous test series on Reid Bedford Model sand and Ottawa sand. The results from tests of the four sands were compared, and a statistical analysis was presented which produced an empirical equation relating relative density to overburden pressure, SPT N-value, and coefficient of uniformity. Comparisons also were made between this work and that of Gibbs and Holtz at the Bureau of Reclamation and Bazaraa at the University of Illinois. Conclusions based on both series of tests were presented. (Visocky-ISWS)
W78-05367

LIQUEFACTION POTENTIAL OF DAMS AND FOUNDATIONS REPORT 3: DEVELOPMENT OF AN ELASTIC-PLASTIC CONSTITUTIVE RELATIONSHIP FOR SATURATED SAND,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavements Lab.
G. Y. Baladi, and B. Rohani.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A037 192, Price codes: A04 in paper copy, A01 in microfiche. Research Report S-76-2, February 1977. 56 p, 14 fig, 1 tab, 13 ref, 1 append.

Descriptors: *Dam foundations, *Saturated soils, *Sands, Elasticity(Mechanical), Plasticity, Soil physical properties, Stress analysis, Strain, Pore pressure, Hysteresis, Hydrostatic pressure, Shear, Loads(Forces), *Liquefaction(Soils), *Constitutive relationship.

This report described the initial attempt at developing a three-dimensional constitutive relationship for saturated sand. An isotropic constitutive relationship was constructed, within the framework of the incremental theory of plasticity, that qualitatively simulates some of the features of the stress-strain-pore pressure response of saturated sand. It accounts for the hysteretic behavior of pressure-volumetric strain-softening behavior and does not predict progressive increase of pore pressure under low-amplitude (subyield) cyclic loading conditions. The behavior of the constitutive relationship under conventional undrained triaxial test condition was examined and correlated with experimental data for saturated Reid Bedford Model sand. A recommendation was made that the present constitutive relationship be extended to quantitatively simulate the basic features of the stress-strain-pore pressure response of saturated sand, including the strain-softening behavior and the progressive increase of pore pressure observed under cyclic loading conditions. (Visocky-ISWS)
W78-05368

DAM IN THE VILYUY HYDRAULIC POWER SYSTEM,
A. N. Demidov.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 072, Price codes: A02 in paper copy, A01 in microfiche. Cold Regions Research and Engineering Laboratory Draft Translation 526, May 1976. 14 p, 2 fig. Translated from Trudy Gidroproekta, No. 34, p 64-77, 1973.

Descriptors: *Dams, *Rockfill dams, *Earth dams, *Cold weather construction, Cold regions, Subarctic, Construction, Dam construction, Design, Dam design, Structures, Hydraulic structures, Permafrost, *USSR.

The Vilyuy hydroengineering system is located on the Vilyuy River (Yakutskaya ASSR) in uninhabited taiga, far from railroads and ports. The climate in the region is decidedly continental, with a cold snowless winter and short hot summer. The mean annual air temperature is -8C. The temperature dips to -65C in the river valley; and during hot days of summer, the air is heated to +35C. The annual precipitation is only 290 mm. The lack of snow cover and negative mean annual air temperature are factors that result in the formation of heavy permafrost (200-300 m deep), with the exception of thawed soil beneath the river bed. The water regime of the river is characterized by extremely nonuniform runoff: 82% of the annual runoff occurs in the spring, 16% during the summer and autumn, and only 2% all winter. The spring high water discharge has reached 13,000 cum/s (1959), and the winter discharge has fallen to as low as 2 cum/s. The Vilyuy rock and earth-filled dam is 75 m high and is the highest of such dams of this type built in the USSR. The total volume of the dam is 5.1 million cubic meters. The design and construction techniques used for this dam were discussed. (Sims-ISWS)
W78-05589

8E. Rock Mechanics and Geology

DESIGN UNDER STOCHASTIC GROUNDWATER FLUCTUATION,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
I. Bogardi, and L. Duckstein.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 104, No. HY1, Proceedings Paper 13499, p 59-74, January 1978. 4 fig, 3 tab, 22 ref, 4 append.

Descriptors: *Aquifers, *Groundwater, *Concrete structures, *Stochastic processes, *Failure(Mechanics), Probability, Subsurface waters, Waterproofing, Economics, Foundations, Hydraulics, Hydrology, Time series analysis, Model studies, Submergence, Risks, Water quality, Chemical degradation, Mathematical models, *Hungary, *Danube River, *Budapest(Hungary), Bivariate analysis, Decision theory.

A foundation is to be protected against the harmful effects of sulfur groundwater, whose piezometric head fluctuates in a random manner. The stochastic process forms a partial duration series, where the jth event is defined by the maximum exceedance above the foundation floor, the duration and interarrival time until the (j +1)st event. To protect the structure against possible damage by high levels of groundwater with substantial sulfate concentration, it is possible to make four decisions, corresponding to waterproofing or using special sulfate resistant concrete or both, or providing no protection. The annual cost and expected loss associated with each of these four decisions were calculated with the help of explicit expressions. Sensitivity of the decision to sample, model, and economic uncertainty was analyzed as well as the possibility of using a Bayesian approach to account for sample uncertainty. (Visocky-ISWS)
W78-05570

EARTHQUAKE ACTIVITY AND GROUND SHAKING IN AND ALONG THE EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, CA. Office of Earthquake Studies.
For primary bibliographic entry see Field 2L.
W78-05638

FAULTING, INSTABILITY, EROSION, AND DEPOSITION OF SHELF SEDIMENTS, EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05639

SEISMIC AND VOLCANIC RISK STUDIES - WESTERN GULF OF ALASKA,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W78-05640

BEAUFORT SEACOAST PERMAFROST STUDIES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-05642

BENTHOS-SEDIMENTARY SUBSTRATE INTERACTIONS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W78-05643

SHALLOW FAULTING, BOTTOM INSTABILITY, AND MOVEMENT OF SEDIMENTS IN LOWER COOK INLET AND WESTERN GULF OF ALASKA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 2L.
W78-05644

SEISMICITY OF THE BEAUFORT SEA, BERING SEA AND GULF OF ALASKA,
National Geophysical and Solar Terrestrial Data Center, Boulder CO.
For primary bibliographic entry see Field 2L.
W78-05645

8F. Concrete

DESIGN UNDER STOCHASTIC GROUNDWATER FLUCTUATION,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 8E.
W78-05570

8G. Materials

PLASTIC ROTARY PUMP PROVIDES 20 YEARS OF SERVICE.
Industrial wastes, Vol. 24, No. 1, p 19, January/February, 1978.

Descriptors: *Chlorination, *Corrosion control, *Industrial wastes, *Metals, *Pumps, Construction materials, Plastics, Linings, Equipment, Design data, Waste water treatment.

A corrosion-resistant plastic rotary pump, manufactured by the Vanton Pump and Equipment Corp of Hillside, New Jersey, has been operating efficiently for more than 20 years at the S. K. Wellman Corp plant in Bedford, Ohio. The rotary pump injects chlorine into the corrosive waste water from the metal plating of earth handling equipment parts, brakes, and clutches. The neoprene flexible liners are the only parts of the pump requiring routine replacement, about 12 times within 20 years, because of exposure to wear and chlorine. The sectioned polyethylene body blocks are the only other parts exposed to chlorine and wastes during pump operation. The liquid is pressed between an oscillating, liner-covered shaft and the body blocks and forced toward the outlet by a squeegee action. Flanges located on the liners engage with the grooved endplate and mounting pedestal, compressing the liquid against the body block. The pump, which contains a self-priming mechanism, eliminates the need for stuffing boxes, packing glands, and mechanical shaft seals. (Lisk-FIRL)
W78-05305

THE SUCCESS OF REINFORCED PLASTICS FOR PROCESS PLANT IN CORROSIVE ENVIRONMENTS,
J. F. Burbridge.
Reinforced Plastics, Vol. 21, No. 12, p 387-391, December, 1977. 4 fig.

Descriptors: *Plastics, *Corrosion, *Chemical industry, *Food processing industry, *Oil industry, Construction materials, Metals, Pulp and paper industry, Sewage treatment, Aluminum, Stainless steel, Corrosion control, Industrial wastes.

The application of glass fiber-reinforced polyester resin in many industrial operations has proved that reinforced plastics are less susceptible to corrosion and more cost-effective than many metallic materials. A comparison of the corrosion resistance of metals and reinforced plastic to various chemicals showed that the reinforced bisphenol-A resin and the more expensive Hastelloy C were more resistant to chemical attack than carbon steel, stainless steel, and aluminum. The reinforced bisphenol-A resin also proved more resistant to chemical corrosion than other polyesters. The glass fiber-reinforced polyester resin has been effectively used for chemical storage tanks, reaction tanks, and pipelines in the chemical production industry. Ducts, scrubbers, and stacks constructed of plastic have been employed for corrosive gas handling operations; pipelines of reinforced resin have withstood years of use in waste water transport. Bisphenol resin liners have been applied to the high-temperature, acidic electrolytic refinement of copper and manganese and also in solvent extraction processes for copper, uranium, and rare earth elements. Polyester resins do not influence the taste of food processing products and have been applied to treatment facilities for the pulp and paper industry and storage facilities for the oil and chemical industries. (Lisk-FIRL)
W78-05338

WAVE FORCES ON SUBMERGED PIPELINES-A REVIEW WITH DESIGN AIDS,
Naval Construction Battalion Center, Port Hueneme, CA. Civil Engineering Lab.
For primary bibliographic entry see Field 8B.
W78-05364

LIQUEFACTION POTENTIAL OF DAMS AND FOUNDATIONS; REPORT 2, LABORATORY STANDARD PENETRATION TESTS ON PLATTE RIVER SAND AND STANDARD CONCRETE SAND,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavements Lab.
For primary bibliographic entry see Field 8D.
W78-05367

LIQUEFACTION POTENTIAL OF DAMS AND FOUNDATIONS REPORT 3: DEVELOPMENT OF AN ELASTIC-PLASTIC CONSTITUTIVE RELATIONSHIP FOR SATURATED SAND,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavements Lab.
For primary bibliographic entry see Field 8D.
W78-05368

EFFECT OF STEAM PURITY ON PERFORMANCE, RELIABILITY AND MAINTENANCE OF INDUSTRIAL STEAM TURBINES,
General Electric Co., Lynn, MA.
G. P. Wozney, A. Whitehead, and R. E. Sperry.
In: TAPPI Engineering Conference, Atlanta, Georgia, September 19-22, 1977, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 245-256. 11 fig, 8 illus, 3 tab.

Descriptors: *Steam turbines, *Steam, *Operation and maintenance, Turbines, Wastes, Reliability, *Corrosion, Water types, Equipment, Maintenance, Performance, Water pollution, Pulp and paper industry, Scaling, Training, Labor, Performance.

The impact of various contaminants on steam path efficiency and turbine capability is described and evaluated, and the effect of plugging and corrosive deposits on mechanical reliability, material performance, and turbine maintenance are discussed. The principal steam contaminants which adversely affect turbine operation are identified. The causes and mechanisms of vaporous and mechanical carryover are outlined and the contributions of desuperheating fluid contamination are examined. The effects of variant steam conditions and load changes are illustrated with several examples. The desirability of establishing a steam purity specification is discussed and a purity level is proposed for industrial steam turbines. Analytical methods for evaluating steam purity are reviewed. The importance of operator training, maintenance practices, and operational checks in maintaining steam purity is emphasized and suggestions for improvements in these areas are offered. (Witt-IPC)
W78-05476

DESIGN FOR CORROSION CONTROL OF POTABLE WATER DISTRIBUTION SYSTEMS,
Naval Civil Engineering Lab., Port Hueneme, CA.
F. M. Reinhart, and J. F. Jenkins.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A006 806, Price codes: A05 in paper copy, A01 in microfiche. Report No. AFWL-TR-73-218, January, 1975. 72 p, 4 tab, 27 ref. 63723F, Project 683M, Task 02.

Descriptors: *Potable water, *Distribution systems, *Corrosion control, Construction, Civil engineering, Domestic water, Design standards, Water supply, Conduits, Water storage, Protective coatings, Pipes, Cathodic protection, Plastic pipes, Metal pipes, Mains.

A survey of literature pertaining to corrosion problems and their control in domestic water and water distribution systems, especially for use in design of new construction at U.S. Air Force bases was conducted. Corrosion-related variables encountered with respect to source of water supply, storage tanks, mains, and distribution lines for both hot and cold water supplying domestic water at the bases are covered. Methods of reducing the corrosion of metals used in these systems are considered, by identifying potential causes for corrosion in the soil and other external envionments and in the domestic water itself. Many procedures to anticipate and control corrosion are presented, including the use of protective coatings, cathodic protection, and plastic composities as a substitute for metals. Problem areas such as galvanic corrosion, proper surface preparation, and techniques for application of protective coatings are also considered. Guidelines that combine economic considerations with practical corrosion control procedures and that will give the most effecient service life compatible with a projected time of use requirement are given. Specific applications are suggested for producing wells, treatment plants, water storage facilities, distribution facilities, and water service in buildings. (Wares-IPA)
W78-05624

DYNAMICS OF NEAR-SHORE ICE,
Cold Regions Research and Engineering Lab., Hanover, NH.
For primary bibliographic entry see Field 2C.
W78-05630

OFFSHORE PERMAFROST - DRILLING, BOUNDARY CONDITIONS, PROPERTIES, PROCESSES AND MODELS. DELINEATION OF MOST PROBABLE AREAS FOR SUBSEA PERMAFROST IN THE CHUKCHI SEA FROM EXISTING DATA. SUBSEA PERMAFROST: PROBING, THERMAL REGIME AND DATA ANALYSIS,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-05641

8I. Fisheries Engineering

HYDRODYNAMICS OF BUBBLE PLUMES AND OXYGEN ABSORPTION IN STRATIFIED IMPOUNDMENTS,
College of Petroleum and Minerals, Dharan (Saudi Arabia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-05371

ECOLOGICAL AND AESTHETIC IMPLICATIONS FOR THE MERRIMACK ESTUARY OF THE MERRIMACK BASIN WASTEWATER MANAGEMENT ALTERNATIVES,
Massachusetts Univ., Gloucester, Marine Station.
For primary bibliographic entry see Field 5C.
W78-05554

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

EXECUTIVE SUMMARY, DIRECTIONS IN U. S. WATER RESEARCH: 1978-1982.
Federal Coordinating Council for Science, Engineering and Technology, Washington, DC. Committee on Water Resources Research.
For primary bibliographic entry see Field 6B.
W78-05203

EVALUATION OF ALTERNATIVE PROCEDURES FOR REVIEW OF WATER RESOURCES RESEARCH PROPOSALS.
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 9D.
W78-05344

WATER RESOURCES RESEARCH IN PENNSYLVANIA.
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 9D.
W78-05351

WATER RESOURCES RESEARCH IN NEBRASKA, FOURTH EDITION.
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 9D.
W78-05354

ANNUAL REPORT FISCAL YEAR 1976, DELAWARE WATER RESOURCES CENTER.
Delaware Univ., Newark.
For primary bibliographic entry see Field 9D.
W78-05355

9D. Grants, Contracts, and Research Act Allotments

EXECUTIVE SUMMARY, DIRECTIONS IN U. S. WATER RESEARCH: 1978-1982.
Federal Coordinating Council for Science, Engineering and Technology, Washington, DC. Committee on Water Resources Research.
For primary bibliographic entry see Field 6B.
W78-05203

EVALUATION OF ALTERNATIVE PROCEDURES FOR REVIEW OF WATER RESOURCES RESEARCH PROPOSALS.
Massachusetts Univ., Amherst. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 810, Price codes: A04 in paper copy, A01 in microfiche. Publication No. 59, Special Report, Sept. 1975. 59 p, 4 tab, 4 ref, 3 append. Workshop proceedings: New England Council of Water Center Directors and the Northeast Water Institute Directors, held in Durham, NH, June 18-19, 1975. OWRT A-999-MASS(12).

Descriptors: *Appropriation, *Grants, *Priorities, *Evaluation, Financing, Projects, Allotments, Value, Model studies, *Project funding.

The question of how, given limited funds, funding agencies should choose among project grant applications was discussed. The evaluation systems used by agencies such as OWRT, EPA, ARS, U.S. Geological Survey, National Sea Grant Program(NOAA), NSF, and Army Corps of Engineers were outlined. Evaluation techniques used by Water Resources Research Institute directors include peer review, internal (i.e., university facility) committees, external (i.e., practitioner or agency) committees, and rating systems. The results of a University of Massachusetts exercise in whi.h 12 mock proposals (in the form of OWRT Executive Summaries) were presented to 2 types of evaluators for priority ranking are discussed. The evaluation consisted of (1) 14 judgmental 'gut' reactors (practitioners from non-university settings, all experienced in water resources work), asked to evaluate on the basis of experience and intuition, and (2) 14 'programmed' reactors (institute directors) asked to evaluate using a standard pre-designed scale of criteria. The 'exercise' is described in detail in Appendix A. Results indicate that 'gut' reactors responded with extreme variability, and although only 5 out of 14 'practitioner' reactors had responded, there was an absence of any apparent agreement among or between either gut or programmed respondents. Individuals within both groups appeared to differ randomly in their reactions. It was concluded that water resources proposal evaluation processes are primitive and lacking in standards. A paper further analyzing the 'exercise' responses is presented in Appendix B, and the format for a more rigorous follow-up study is presented in Appendix C. (Seip-IPA)
W78-05344

TWELFTH ANNUAL REPORT, PROGRAM ACTIVITIES, FISCAL YEAR 1976, (MASSACHUSETTS WATER RESOURCES RESEARCH CENTER).
Massachusetts Univ., Amherst. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 002, Price codes: A06 in paper copy, A01 in microfiche. 1976. 107 p, 4 fig, 3 tab, 22 ref. OWRT A-999-MASS(13).

Descriptors: *Water Resources Research Act, *Research and development, Grants, *Projects, *Massachusetts, Education, Universities, Colleges, Training, *Water Resources Institute, *Project status report.

Status reports of 30 active projects (18 annual allotment, 6 matching grant, 4 title II, and 2 special projects), conducted at the Massachusetts Water Resources Research Center during Fiscal year 1976 are presented. The director's statement cites projects in several investigation categories, including water quality assessment and sampling, pollution prevention and control, planning, ecological impacts of land development, and technology transfer. A list of official publications is included. (Seip-IPA)
W78-05346

WATER RESOURCES RESEARCH IN PENNSYLVANIA.
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 043, Price codes: A04 in paper copy, A01 in microfiche. Information Report No. 77, January, 1976, L. Mullenneaux and A. J. McDonnell, Eds. 60 p. OWRT A-023-PA(2).

Descriptors: *Abstracts, *Water resources, *Water resources development, *Pennsylvania, *Research and development, *Projects, Census, Investigations, Personnel scientific personnel, Universities, Colleges, Industries, Surveys, State government, *Research project inventory, Agencies.

A summary of a recent questionnaire survey of water resources research activities currently being conducted in Pennsylvania is presented. Included are abstracts of the activities of (1) universities and colleges, (2) state and municipal agencies, (3) federal agencies in Pennsylvania, and (4) private industries. An inventory of Pennsylvania water research projects and personnel, indices of investigators, keywords for abstracts, and keywords for investigators areas of interest are included. (Seip-IPA)
W78-05351

MINUTES - IOWA STATE WATER RESOURCES RESEARCH INSTITUTE ADVISORY BOARD AND COUNCIL TENTH ANNUAL MEETING.
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 6B.
W78-05353

WATER RESOURCES RESEARCH IN NEBRASKA, FOURTH EDITION.
Nebraska Univ., Lincoln. Water Resources Research Inst.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 044, Price codes: A06 in paper copy, A01 in microfiche. NWRRI Publication No. 10, June, 1976. 95 p. OWRT A-999-NEB(18).

Descriptors: *Abstracts, *Water resources development, Water pollution, Water quality, Artificial recharge, Conservation, Ecology, Economics, Eutrophication, Evaporation, Transpiration, Fish, Wildlife, Geology, Soils, Groundwater, Hydrology, Irrigation, Model studies, Planning, Plant tissues, Vegetation, Rivers, River training, Social impact, Political aspects, Institutional constraints, Data collections, Waste water treatment, Water utilization, Efficiencies, *River engineering, Plants, Water use efficiency.

Abstracts of nearly 100 water resources studies currently being conducted in Nebraska are presented. Agency, author, and key word indices are given; projects are cross-referenced by key words. Major subdivisions of research areas include artificial recharge, conservation, ecology, economics, eutrophication, evapotranspiration, fish and wildlife, geology and soils, groundwater, hydrology, irrigation, modeling, planning, plants, river engineering, social-political-institutional aspects, water data, water quality and pollution, water and waste treatment, and water use efficiency. (Seip-IPA)
W78-05354

ANNUAL REPORT FISCAL YEAR 1976, DELAWARE WATER RESOURCES CENTER.
Delaware Univ., Newark.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 056, Price codes: A05 in paper copy, A01 in microfiche. August, 1976. 69 p, 12 tab. OWRT A-999-DEL(7).

Descriptors: *Delaware, *Water resources planning, *Water Resources Institute, Universities, Education, Colleges, Training, *Annual re-

port(Delaware), Fiscal Year 1976, Delaware Water Resources Council, Fiscal Statement, Public Law 88-379.

The twelfth Annual Report of the University of Delaware Water Resources Center for the year July 1, 1975 to June 30, 1976 (F.Y.1976) is presented. Section I contains the Director's Statement of current and anticipated water problems, research program emphases and results, and a review of accomplishments and activities. Section II contains examples of research findings and their actual or potential application to water resources problems. A progress report for each of ten annual allotment Program Projects comprises Section III. Accomplishments in the training of scientists in water resources are summarized in Section IV; research effort is combined with primary educational responsibilities under this program (P.L. 88-379). Publications and theses relating to Water Resources Research Program activities are listed in Section V. The fiscal information for each project in FY 1976 annual allotment program and for the operation of the Director's Office is contained in Section VI, and Section VII comprises a fiscal summary of the total annual allotment program (Seip-IPA)
W78-05355

UNITED STATES GEOLOGICAL SURVEY YEARBOOK, FISCAL YEAR 1977.
Geological Survey, Reston, VA.
For sale by Supt. of Documents, GPO Washington, D.C. 20402. 1978. 229 p, 52 tab.

Descriptors: *Reviews, *Annual, *Projects, *Data collections, *Natural resources, Water resources, Water quality, Energy, Mapping, Geological surveys, Volcanoes, Landslides, Indian reservations, Mineralogy, Land management, Oil industry, Programs, Administration, Cost allocation, Budgeting, *US Geological Survey.

This Yearbook summarizes the progress made by the United States Geological Survey during fiscal year 1977 in its mandated role--to identify the Nation's land, water, energy, and mineral resources; to classify Federally-owned mineral lands and water power sites; to regulate the exploration and development of energy and mineral resources on Federal and Indian lands; and to explore and appraise the petroleum potential of the National Petroleum Reserve in Alaska. As a report to Congress and the public, it falls logically into five parts: (1) The Year in Review: a look at the major issues and events which affected Survey programs, and some performance highlights; (2) Perspectives: a series of concise Earth-science essays which address national issues; (3) Missions, Organization, and Budget: a description of the Geological Survey's major duties and assignments and of the organizational and fiscal structures that support its missions; (4) A description of the activities and accomplishments of each of the nine operating Divisions and Offices; and (5) Statistical Tables: summary data which documents program trends, workloads, and significant 1977 accomplishments. (Woodard-USGS)
W78-05419

SUMMARY REPORT - INSTITUTE IMPROVEMENT WORKSHOP FOR DIRECTORS OF WATER RESOURCES RESEARCH INSTITUTES.
Iowa State Water Resources Research Inst., Ames.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 034, Price codes: A04 in paper copy, A01 in microfiche. Workshop held in Washington, DC., January 24-25, 1977. Report No. ISWRRI-89, July 1977, M.D. Dougat, Ed. 63 p, 1 tab, 10 ref, 5 append.

Descriptors: *Administration, *Management, *Water resources development, Programs, Project planning, Decision making, Evaluation, Analysis, Research, *Water Resources Research Institutes, *Program evaluation, Institute administration, Research planning.

Proceedings of an institute improvement workshop for the directors of state and territorial institutes are reported. Self-evaluation was emphasized in order to further the goal of achieving a more effective institute in each state and designated territory, one that is responsive to local, state, regional and national needs. University programs at each institute centering on research, training, and public service through technology transfer were reviewed. The following broad recommendations resulted from the workshop: (1) increase the emphasis on technology transfer, information dissemination, and public service activities; (2) strengthen the interface with state and federal agencies within each state, and with the basin commissions, interagency committees, and the federal Water Resources Council; (3) broaden institutes' ability to be more effective as multiple university entities in a state; (4) further the coordination of water resources research at the federal level by the federal OWRT organization; (5) develop an adequate institute/congressional interaction program; and (6) implement criteria for establishing adequate institute administration and management. Specific goals and implementation suggestions are included under each recommendation. (Seip-IPA)
W78-05479

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

VIRUSES IN WASTE, RENOVATED, AND OTHER WATERS, 1975 LITERATURE ABSTRACTS.
Environmental Monitoring and Support Lab. Office of Research and Development.
For primary bibliographic entry see Field 5D.
W78-05490

CATALOG OF UNITED STATES CONTRIBUTIONS TO THE INTERNATIONAL HYDROLOGICAL DECADE 1965-1974.
National Committee for the International Hydrological Decade, Washington, DC.
For primary bibliographic entry see Field 2A.
W78-05590

BIBLIOGRAPHY OF STATISTICAL AND METEOROLOGICAL METHODOLOGY IN WEATHER MODIFICATION,
Florida State Univ., Tallahassee. Dept. of Statistics.
For primary bibliographic entry see Field 3B.
W78-05591

HAZARDOUS MATERIALS WASTE DISPOSAL (A BIBLIOGRAPHY WITH ABSTRACTS).
National Technical Information Service, Springfield, VA.
For primary bibliographic entry see Field 5E.
W78-05675

10D. Specialized Information Center Services

EFFECTIVENESS OF TECHNOLOGY TRANSFER PROGRAMS,
Texas Univ. at Austin. Dept. of Civil Engineering.
L. R. Beard.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-279 140, Price codes: A03 in paper copy, A01 in microfiche. Technical Report No. CRWR-140, Sept. 1976. 42 p, 6 tab, 1 append. OWRT X-149 (No. 5266)(1).

Descriptors: *Information exchange, Research and development, *Technology transfer, Information dissemination, Implementation techniques.

New concepts in technology transfer (specifically, implementation of research result into engineering practice) and information dissemination are discussed. Criteria for effectiveness of technology transfer are that: (1) the procedure be implemented into practice, optimally to the stage of practice manuals; (2) the user understands new procedures; (3) research results are of sufficient benefit to warrant efforts of adoption; (4) sufficient data exist for procedure implementation; (5) procedures be acceptable to high-level technical reviewers. The usefulness of research is currently diminished because: (1) the market is frequently flooded with minimally valuable research reports (2) practitioners need results expressed in their vernacular (technical research language aggravates practitioners' problems of recognizing and applying useful research); (3) practitioners mistrust research results and are leery of using them; (4) research results have insufficient impact on practice to warrant implementation; (5) initial costs are high and time lag is long in implementation; and (6) some results are overly sophisticated for many applications, making the cost/benefit ratio high. Suggestions for improving the practical value of research include: (1) cooperative research; (2) short-term exchange of researchers and practitioners; (3) establishment of specialty research centers for screening new materials; (4) in-house research; and (5) frequent and open communication between researchers and users. Availability can be increased by (1) providing step-by-step procedures for application; (2) utilizing literature search aids; (3) increasing circulation of agency procedure manuals; and (4) conducting short courses in specific areas. (Seip-IPA)
W78-05486

10E. Translations

TRANSLATION OF REPORTS ON SPECIAL PROBLEMS OF WATER TECHNOLOGY, VOLUME 9 - ADSORPTION.
Karlsruhe Univ., (West Germany). Dept. of Water Chemistry.
For primary bibliographic entry see Field 05F.
W78-05544

10F. Preparation Of Reviews

FORECASTING THE COMPOSITION AND WEIGHT OF HOUSEHOLD SOLID WASTES USING INPUT-OUTPUT TECHNIQUES--AN EXECUTIVE SUMMARY,
Ebon Research Systems, Washington, DC.
For primary bibliographic entry see Field 05B.
W78-05551

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ABSORPTION
Industrial Filtration, Fundamentals of Media Selection, Filter Design and Installation.
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Tritium Oxide Uptake By Algae: An Independent Measure of Phytoplankton Photosynthesis,
W78-05559 5A

ABSTRACTS
Water Resources Research in Pennsylvania.
W78-05351 9D

Water Resources Research in Nebraska, Fourth Edition.
W78-05354 9D

Viruses in Waste, Renovated, and Other Waters, 1975 Literature Abstracts.
W78-05490 5D

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W78-05345 5G

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W78-05339 5A

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Annual Report Fiscal Year 1976, Delaware Water Resources Center.
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